FEBRUARY 27, 1922

AVIATION

VOL. XII. NO. 9

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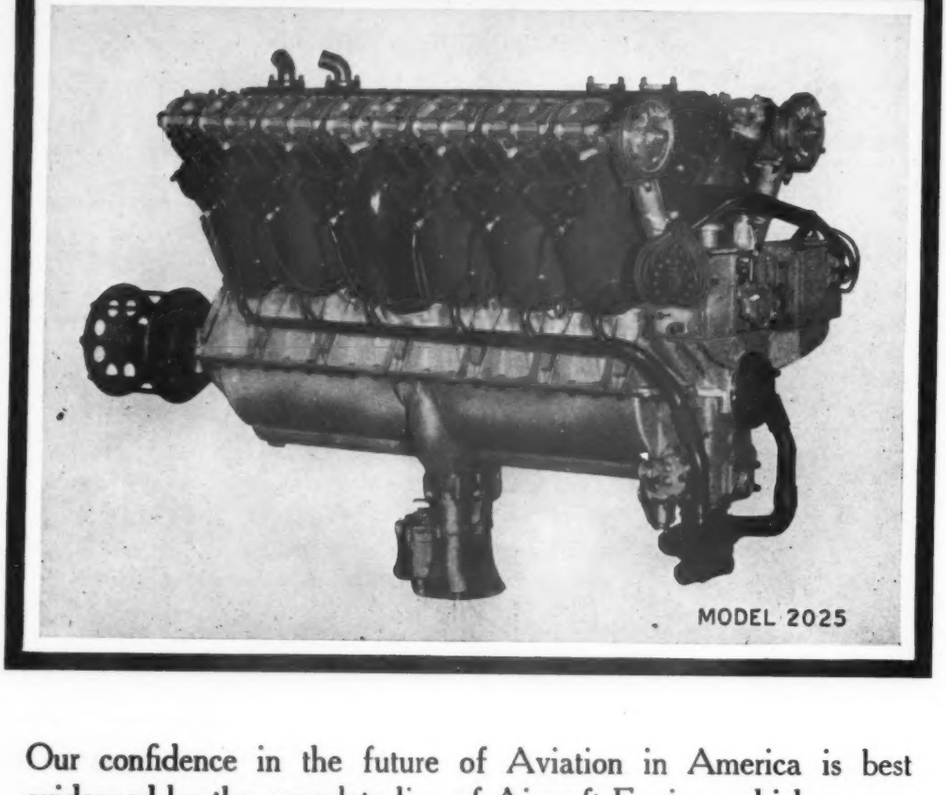

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AVIATION

LADISLAS D'ORCY, EDITOR
V. E. CLARK
EDWARD P. WARNER
RALPH H. UPSON
CONTRIBUTING EDITORS

Vol. XII FEBRUARY 27, 1922 No. 9

Heroes of Peace

PEACE brings a return to normal in all military and naval occupations except in the air service. It is here that the hazards are not confined to warfare. New development is necessary and one of the inevitable results of progress is to be seen in the sad fate of those who made their last flight with the Roma.

The annals of the United States will always contain pages of brilliant achievements of her sons in the air. These are not confined to wartime alone. Our early pioneers of flight risked their lives willingly to advance their chosen art. It will ever be so with the men who soar into the heavens and add their part to the world's knowledge. Those brave comrades of the air who have lost their lives in the Roma accident have gained the glory that comes from having given their all in the advancement of our country's national security.

They were our friends. We took pride in their achievements and successes. We now bow our heads in sorrow over their supremely sad sacrifice in this the greatest of all tragedies of our air history.

Aeronautical Research and Experimentation

THE recent bombing tests off the Virginia Capes were completely conclusive evidence of the tremendous possibilities of the airplane as a military weapon. It is believed that the willingness of the several powers to cut their naval programs can be directly traced to the results of these bombing tests.

Yet aerial warfare is in its infancy. For example, the recent bombing tests were carried on under 4000 ft. altitude with what were known to be comparatively crude bomb sights. Until recently the highest altitude that these bombing airplanes —the Martin Bombers—could reach was 9,000 or 10,000 ft. where in daytime bombing they would have been visible from the ground and subject to anti-aircraft fire. Since these tests the supercharger principle has been applied to the Martin Bombers and they have flown that airplane to an altitude of 27,000 ft.—the highest point ever reached by a multi-motored airplane of this size.

The tremendous importance to the country of this fundamental research work which has been so successfully carried on at McCook Field can not be over estimated.

Now that our bombing planes can fly above 25,000 ft. and there be completely invisible from the ground and therefore safe from anti-aircraft fire, it remains for the Air Service Engineers to solve the problem of developing a bomb sight which will make it possible to do accurate and certain bombing from this tremendous altitude. Certainly sights have been developed for guns to shoot at this range. No one can gainsay the possibility of developing a bomb sight that will do this same thing.

The people of this country are convinced of the importance of the military and commercial development of the airplane. Congress should recognize the work that has been done by the Air Service and the paramount importance to this country of holding together the efficient research organization now in existence at McCook Field and allow the proper funds to continue to carry on this important work.

What is a Subsidy?

THERE is a popular belief that the genius of the American people is unconquerably opposed to subsidies to any particular industry, but there is nothing in the past history of the United States to indicate that such is the case. The protective tariff is nothing but a subsidy, every embargo is a subsidy, and even aside from those industrial grants there has been frequent legislation in the past to assist railroads, the merchant marine and other enterprises judged to be essential to the public welfare. A particularly notable instance is the allotment of numerous amounts of the public demand to the so-called land-grant railroads in the early days of the opening up of the West.

The most fundamental objection to a subsidy seems to arise from the general feeling that any move in the direction of subsidization of an industry means an expenditure of untold wealth, the appropriation of sums large even in these days of huge governmental budgets. That feeling, however, in the case of aircraft, like the belief as to the absence of subsidies in the past, is not founded on facts. The subsidy expenditures of European nations which grant governmental assistance to companies operating commercial aircraft are extraordinarily small, and it is astonishing to see how much can be done with a moderate appropriation. The British government, for example, expended on behalf of civil aviation during the last complete fiscal year only £200,000 ($850,000). The French republic allotted to airplane subsidies in the same period 33,000,000 francs ($2,500,000) and this sum was sufficient, as is well known, to keep lines operating between Paris and London, Paris and Brussels, Paris and Warsaw, Bordeaux and Santander, Marseilles and Montpellier, and Toulouse and Casablanca, in addition to several shorter or intermittent routes. The Deutsche Luftreederei received a subsidy from the financially harrassed German government of approximately 15,000,000 marks, or $200,000 at the rate of exchange then existing, and ran lines all over Germany as a result.

A subsidy policy for the United States may be unwise or unnecessary, but it should not be dismissed as involving vast expenditures, as practically every nation in Europe has come to subsidization of one sort or another and as it is evident from that fact and from the statistics enumerated above that the financial burden is not really so crushing as a superficial inspection might lead one to suppose. Indeed, the expenditure is almost insignificant on the scale by which governmental expenditures are habitually measured at the present time.

Airway Field System and Investment

Discussion of the Type and Cost of Airdromes Required on Public Passenger Air Transport Service

By Archibald Black

In the course of our studies of commercial air transportation we have found it necessary to consider various methods of providing suitable station landing fields and emergency landing provisions. This short note describes a system which we have worked out and have come to regard as the most generally suitable for the operation of commercial airplane lines.

Leased Station Fields

The system in general use by airways to date consists of the use of leased station fields. When engine or other trouble necessitates a landing between stations the pilot makes use of any clear plot of ground without regard to its ownership. The question of damage is adjusted later with the property owners, who as a rule have been very tolerant so far on account of the novelty of the airplane. This is quite obviously a temporary condition. We have had considerable discussion regarding the advisability of government ownership of landing fields which have, rather inconsistently, been compared to highways, although the railroad would be a more logical analogy. Such government ownership would be divided between municipal, county, state and federal authority and we doubt very much if it is feasible to get all together in one comprehensive system. Even if this arrangement could be systematized, it would probably leave unsettled the vital question of emergency landing spaces.

The necessity of a railroad completely controlling its own right of way is accepted without question. A parallel condition is found in the necessity of complete control of station and emergency landing fields by the company operating an airway on anything like a comprehensive scale. In the case of many cities only a single plot suitable for a landing field is available. Although sounding strange to those who have not come into close contact with the matter, this has been found to be a fact. In such cases the control of what might be called the strategic field is of vital importance to the transportation firm operating into and out of the city in question.

From time to time the transport airplanes will be put to the regrettable necessity of making forced landings between the station fields. Telephone lines, power wires, ditches and other obstructions, not to mention the question of obstructing traffic, eliminate the possibility of using public roads for this purpose. If such landings are continued to be made, as at present, on private property not controlled by the operating company legal action by the owners for recovery of damages will be inevitable as soon as the novelty wears off. By the time justifiable lawsuits are added to those which will inevitably be brought without just cause the total cost may become very serious. Air transport companies will soon become regarded as public utilities and a tendency exists among a certain class to regard public service corporations as legitimate prey in courts of law. This is a point worth keeping in mind.

Emergency Fields

All of the above points to the necessity of the transport firm controlling not only its station landing fields but the necessary emergency landing rights as well. The emergency landing fields being generally located in open country where ground is cheap, they might as well be specially set aside for this purpose instead of any attempt being made to use the space as pasture at the same time. Cows are rather bulky objects to hit when landing with a stalled engine. In either case the fields could be owned by a holding company and leased to the transport firm or simply leased for a long period direct from the owners at present. The system recommended by the author consists of a holding company, under the same control as the transport company, and owning outright each of the station fields, all of the fixed property theron as well as a series of emergency runways along the airway.

Such runways should be sufficiently close to each other to keep the company's machines always within gliding distance of one of them or a station field when flying at 5000 to 6000 ft. above the level of the ground. This would necessitate a chain of landing runways each about 25 miles apart along the route. These runways need not, in any sense of the word, be landing fields but simply long narrow plots preferably of L or X shape and just large enough for a well trained pilot to be able to bring his machine down safely in case of engine failure or similar emergency. The main portion of the runways would be graded to nearly level while the ends would be slightly banked to decrease the possibility of running over the property lines. No doubt a more satisfactory method of shortening the landing run will be developed later, but in any case the runway must be long enough to make a take-off possible. Each plot would be supplied with a small shed containing gasoline, oil, first aid kit, lanterns, a few important spare parts such as tires and spark plugs, emergency tool kit and (where possible) a telephone. The property should be fenced in just sufficiently to discourage potential trespassers, the fence painted black and white alternately to be clearly visible from the air, and warning signs placed where required. A wind cone or other suitable wind indicator should also be provided. Where night flying is to be done the necessary guiding equipment should be included.

Type of Landing Fields

In order to keep the necessary investment or rent to a minimum all ground should be used to the very best advantage both in the emergency runway and the station fields but particularly the latter. The complete question of best utilization of the ground is tied up with many others and will be discussed fully in a later publication. It suffices to say here that a plot about 2000 ft. by 2000 ft., if properly arranged, is suitable for the station field. The general arrangement of a field of this type is shown in Fig. 1 and it will be noted that the diagonal arrangement makes it possible to provide two crossed runways each about 2800 ft. long although the side of the field is only 2000 ft. While smaller plots can be used it is advisable to base estimates upon the 2000 ft. plot to allow for outside obstructions as well as for expansion, of the plant. When the purchase of the plot is being negotiated a strong effort should be made to place, as a condition of purchase, some restrictions upon the heights of future structures on the adjacent property. A restriction limiting the height of structures to about 10 per cent of their distance from the landing field property line.

The necessity of locating station fields as near the city as practicable and in proximity to a good road and to the railroad will probably bring the cost of this property to between $1,000 and $2,000 per acre. The figure of $1,500 per acre for this class of property can probably be taken as a reasonable average although it should be kept in mind that this will increase rapidly if the plot is close to one of the larger cities. On this basis the 2000 x 2000 plot would cost about $138,000. As matters stand at present it is possible to rent a plot of this type for $2,000 to $5,000, per year because it has little value for other than farm use until improved. However such rental is by no means a fair return on the value of the property as this condition cannot be expected to last after landing fields become more used. Figuring a gross return of 7 per cent of the value the rentals of the plot would be about $9,660 per year.

It is possible to reduce the cost of the station field by using L plots instead of square. The L type however, somewhat

limits expansion of the plant in addition to limiting the take-off directions and should therefore be considered only where property cost runs higher than usual or where funds are more limited. Engine trouble during taking off might necessitate landing on the adjoining property with this type of field and the square field is in every way to be preferred.

Minimum Ground Cost

The minimum ground cost is reached by using an L plot having each leg 1800 ft. long by 750 ft. wide. A field of this size, while practicable, is not advisable and where the L field is decided upon it should be at least the size recommended by the Air Service for this type, 1800 ft. by 900 ft. per leg. If possible the size should be increased to 2000 ft. by 1000 ft. per leg. On the basis of cost of $1,500 per acre and rental of 7 per cent these fields would cost as follows: 1800 x 750 field, cost $73,600, rental, $5,152; 1800 x 900 field, cost $83,700, rental, $5,859; 2000 x 1000 field, cost $103,500, rental, $7,245. Obviously the saving in ground cost by using the L field is considerable but this must be balanced against its other disadvantages.

In the case of the emergency runways along the airways there is no vital necessity for purchase or rental of more ground than that actually required for landing from four points of the compass. Indeed where winds are generally from the same direction, as may sometimes be the case, it will only be necessary to provide for two direction landings. The requirements for emergency landing runways can be met by a narrow leg L or X plot. Each leg should be from 1000 to 1500 ft. long by 200 to 250 ft. wide. 250 ft. or more is more advisable but 200 ft. is mentioned because it makes possible the use of property cut by streets into the regulation 200 ft. deep blocks which is another advantage of the runway system. The surface should be slightly banked at the end of each runway to decrease the possibility of running over the property line when effecting a landing. Surrounding property should be so restricted as to building heights as will avoid future structures interfering with the use of the runways.

Such emergency runways being located generally in open country there should be little need for building close to the actual runway and it should be possible to make this restriction a condition of the purchase or rental. To further decrease the cost of the property used the runways need only have a narrow strip about 20 ft. wide connecting with the public roadway and need have no railroad connection. Even if night flying is contemplated it is not of vital importance that the field be close to electric power lines as other types of guide lights, such as acetylene, can be used. It is of some importance to have telephone connection so that there may be no avoidable delay when a forced landing is made.

Fig. 2 shows the proposed arrangement of emergency runways of this type. It should be understood that the dimensions given are to be regarded as the minimum and that they should be increased some where the ground cost and funds available permit. Taking as the average size an L plot having each leg 1250 ft. long by 200 ft. wide, the total ground required will be about 13 acres. Located in open country, as such runways will generally be, this ground will cost $100 to $200 per acre as it falls within the class of farm property. Each emergency runway plot would thus cost on the average about $1950. Rented on the basis of 7 per cent gross revenue to the owners, the annual rental would be $150. It should be noted here that some of the emergency runways may be located fairly close to cities or small towns, in which case these figures would be increased.

Two Tentative Airways

To provide a basis for determining the additional cost of ground required for airway purposes using the proposed emergency runway system two specific projects are considered.

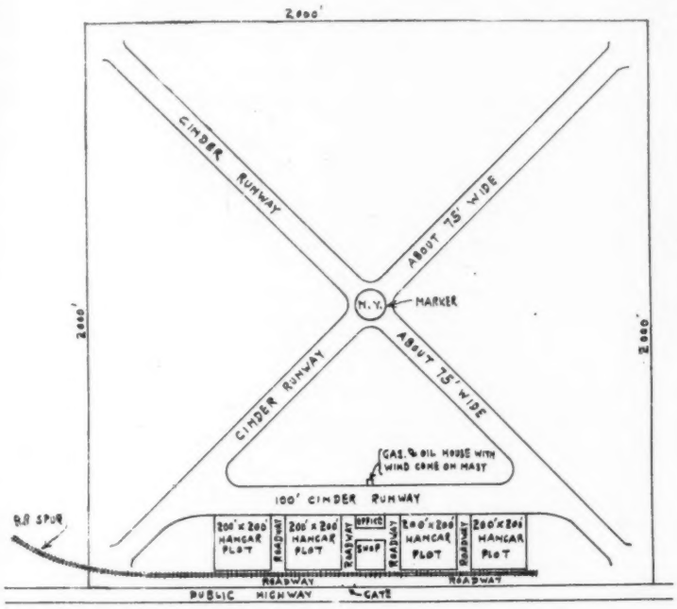


Fig. 1. Square station field

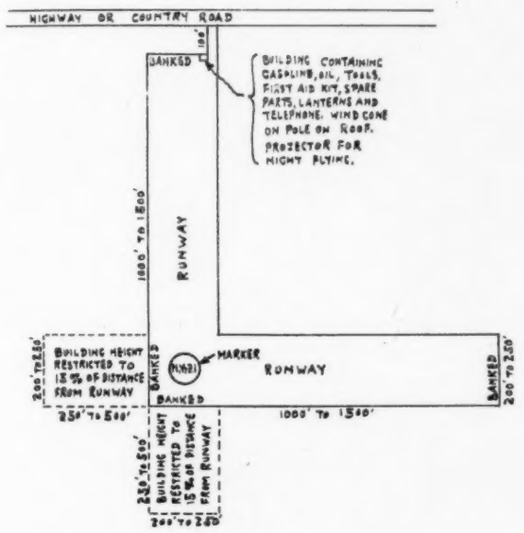

HIGHWAY OR COUNTRY ROAD
BANKED
BUILDING CONTAINING GASOLINE, OIL, TOOLS, FIRST AID KIT, SPARE PARTS, LANTERNS AND TELEPHONE. WIND CONE ON POLE ON ROOF. PROJECTOR FOR NIGHT FLYING.
1800' TO 1800'
RUNWAY
BUILDING HEIGHT RESTRICTED TO 15% OF DISTANCE FROM RUNWAY
MARKER
RUNWAY
BANKED
BANKED
BANKED
250' TO 500'
1000' TO 1500'
250' TO 500'
BUILDING HEIGHT RESTRICTED TO 15% OF DISTANCE FROM RUNWAY
200' TO 250'

Fig. 2. Emergency runway

The maximum distance between station fields is taken as about 400 miles while the maximum distance between emergency runways is taken as about 25 miles in each project. Fig. 3 shows two complete airway systems, one connecting New York with Cleveland and Chicago, the other connecting New York, Washington, Charlotte, Atlanta, New Orleans, Houston, Brownsville (customs), Tampico and Mexico City. The last "jump" calls for altitude flying and might require special equipment. It is however an important leg of the system, offering considerable saving of time over railroad connections. The first system is one with heavy express and passenger traffic to draw upon and where speed is of great importance but with the disadvantage that on the other hand it comes into direct competition with the best railroad service in the country. The second system would have less traffic to draw upon but it would tap a greater number of cities and would compete with a poorer railroad service than the first. Another feature is worthy of mention also. The first system would be forced to solicit its passenger traffic among the more conservative business men of New York and Chicago who would be slow to use the new method of travel. The second system would have a more adventurous class to draw upon and this would probably go a long way to balance the smaller express package business available of this line.

The total ground investment required for these systems with and without the emergency runway system would be roughly as follows:

New York-Chicago

3 station field 2000 ft. x 2000 ft. average $138,000, each	$414,000.00
Rental of fields on 7 per cent gross basis, per year	$ 28,980.00
27 emergency runways average $1950, each	$ 52,650.00
Rental of runways on 7 per cent gross basis, per year ..	$ 3,685.50
Increase due to use of runways ..... 12.7 per cent	

New York-Mexico City

9 station fields 2000 ft. x 2000 ft. average $138,000, each	$1,242,000.00
Rental of fields on 7 per cent gross basis, per year	$ 86,940.00
86 emergency runways average $1950, each	$ 167,700.00
Rental of runways on 7 per cent gross basis, per year ..	$ 11,739.00
Increase due to use of runways ..... 13.5 per cent	

New York-Chicago and New York-Mexico City

11 station fields 2000 ft. x 2000 ft. average $138,000,each	$1,518,000.00
Rental of fields on 7 per cent gross basis, per year	$ 106,260.00
113 emergency runways average $1950, each	$ 220,350.00
Rental of runways on 7 per cent gross basis, per year .	$ 15,424.50
Increase due to use of runways ..... 14.5 per cent	

Cost of Runways

These increases are undoubtedly of importance and to be carefully considered. At the same time it should be kept in mind that the development of the systems and consequent addition of more station fields as other cities were tapped would add intermediate station fields. A case of this type was estimated and showed that the additional cost due to the use of runways dropped below 10 per cent. Also it is scarcely practical anyhow to operate over many of the distances shown in Fig. 3 without some intermediate fields and such fields would cost more than the proposed system of runways if they were

Fig. 3. Map showing proposed New York-Chicago and New York-Mexico City air routes

to be fully equipped. Taking all in all it would appear most probable that the increase of even 12 to 15 per cent would be fully justified by the freedom from crashes of machines with consequent injuries to pilots and damage to freight not to mention the elimination of lawsuits for damages by the owners of property trespassed upon in forced landings. These ground investment figures are large but the financing of any real airway is of the magnitude of new railroad construction in any case, a condition which is not always fully appreciated.

The proposed runways system has another very important advantage. It makes night flying both safe and practical. Each station field and emergency runway can be provided with a beacon consisting of a searchlight pointed vertically the light of which the pilot uses as his guide from runway to runway along the route. Each runway and field would be equipped with flood lights or the airplanes equipped with wing tip flares for use in effecting night landings. On the whole the proposed system certainly appears the most practical for a regular commercial airway.

While this paper is intended only to discuss the question of field system and investment some remarks on the possible saving of time by the use of airplanes will be of interest.

The accompanying table is of interest in showing the saving of time by using airplanes over the routes considered. In compiling it one half hour has been allowed for time travelling to and from fields at each end and one half hour lost time has been allowed for each stop. The last column gives the true railroad rate per straight line mile, being the direct distance divided by the fare. Railroad fares are very deceptive when only the railroad mileage is considered.

TRAVEL BY AIR AND BY RAIL

New York to Cleveland: Railroad fare (total) $28.50. Airplane fare $28.00

Railroad:	Lv. New York 6.50 p.m.	Airplane: Lv. New York 6.00 a.m.
	Arr. Cleveland 8.50 a.m.	Arr. Cleveland 11.00 a.m.
		Lv. Cleveland 6.00 p.m.
		Arr. New York 11.00 p.m.

(Round trip within same day)

Preliminary estimates, based upon Air Mail operating costs show that a fully loaded commercial airplane, carrying about 10 passengers for each 420-450 hp., can be operated at a total cost of about 7 cents per passenger mile. It is not yet certain how close to this ideal condition the commercial airplane can operate. First, such airplanes will seldom be operated fully loaded. Second, this figure does not include the very important cost of getting the business. On the other hand, as the service developed, economies would become possible which would go far to offset the loss due to operating partially loaded planes. The following is interesting in showing what will probably be eventually possible.

PROPOSED NEW YORK-MEXICO CITY AIR SERVICE

From	To	Appr. miles	Airplane stops	Airplane 100 m.p.h. D H M	Airplane 90 m.p.h. D H M	Fastest Railroad Train time D H M	Fastest Railroad Train total fares incl. Pullman	Air Distance R. r. fare cents
New York	Cleveland	400	0	0- 5- 0	0- 5-26	0-14- 0	$ 28.58	7.14
New York	Chicago	735	1	0- 8-51	0- 9-40	0-20- 0	$ 51.07	6.95
New York	Washington	218	0	0- 3-11	0- 3-25	0- 5- 0	$ 12.89	5.91
New York	Charlotte	560	1	0- 7- 6	0- 7-43	0-17-50	$ 28.50	5.09
New York	Atlanta	803	2	0-10- 2	0-10-56	1- 2-55	$ 40.86	5.09
New York	New Orleans	1233	3	0-14-50	0-16-12	1-17-35	$ 62.97	5.10
New York	Houston	1571	4	0-18-43	0-20-28	2- 5-25	$ 79.99	5.09
New York	Brownsville	1881	5	0-22-19	1- 0-24	2-23-15	$ 97.83	5.20
New York	Tampico	2151	6	1- 1-31	1- 3-54	4- 8-25	$121.63	5.65
New York	Mexico City	2361	7	1- 4- 7	1- 6-45	4-17-55	$137.06	5.80

Aviation Executives' Luncheon

Col. Charles DeLano Hine addressed the Aeronautical Executives Luncheon at the Cafe Boulevard, New York, on Feb. 17, on transportation. He sketched the development of railroad transportation since 1820 in the United States and pointed out many promotion, legal and operation difficulties which he considered analagous to the present development of air transport.

Colonel Hine is a West Point graduate, served as an officer of the U. S. Army for four years and then resigned and was admitted to the bar. Later he was a freight brakeman and worked his way up to the vice-presidency of the Baltimore & Ohio Railroad. He served in the Spanish war and commanded a regiment in France during the World War.

Twenty-eight representatives of the aircraft industry located in and near New York listened with interest to Colonel Hine's interesting and helpful talk.

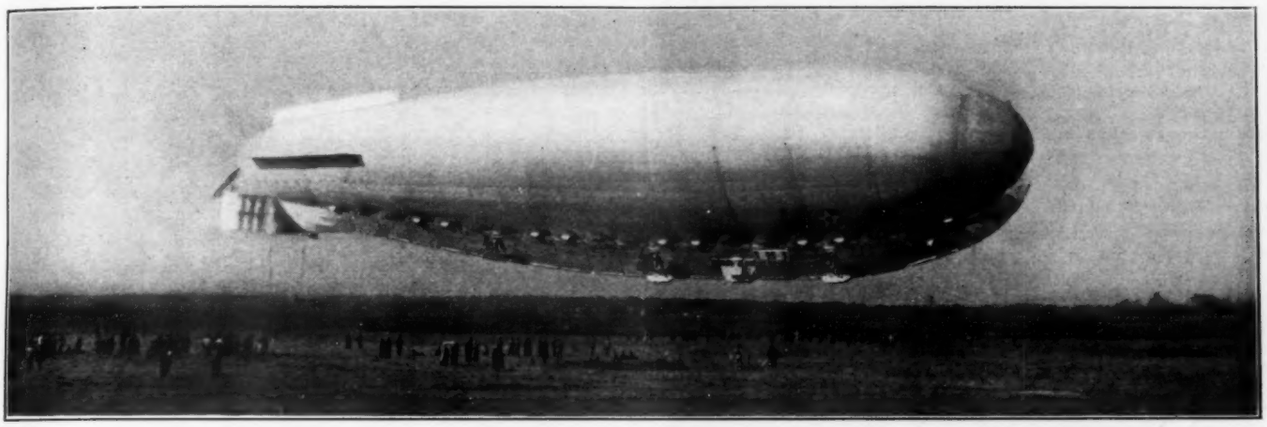
R. R. Blythe, who originated these semi-monthly luncheons of aviation people said that he expected to receive an acceptance to address the next luncheon from A. C. Bedford, Governing Director of the Standard Oil Co., and to secure Will H. Hayes, former Pastmaster General, and R. M. Cowie, Vice President of the American Express Co., as speakers at early meetings. Mr. Cowie, who was to have addressed the meeting on Feb. 17, sent his regrets due to being called suddenly out of town by important business.

Roma Destroyed with Great Loss of Life

In the greatest disaster that ever befell American military aeronautics, thirty-four men were killed on the afternoon of Feb. 21 when the airship Roma fell out of control near the Hampton Roads army base. Only eleven of the forty-five men aloft with her were saved, and some of them were terribly hurt. Three were slightly injured.

Maj. Gen. M. M. Patrick, Chief of the Army Air Service, who flew from Washington to Langley Field immediately after the accident, appointed an investigating board consisting of Davenport Johnson, president, John H. Jouett and George T. McNarney. In the only official statement made at the time Gen Patrick said:

"From the testimony I have heard so far, it is indicated that the disaster was due to an accident to the controls regulating the altitude of the Roma.



The ill-fated U. S. Army airship Roma as she appeared on one of her trial flights

"The ship came down, striking high tension electric wires, which caused the fire. There was no explosion and no fire while the ship was in the air.

"The board of investigation is taking testimony from all the men, and its report will be made as soon as possible. A very thorough investigation is being made to determine, if possible, the cause of the terrible disaster which is an awful blow to the air service.

"Everything possible is being done for the families of those who lost their lives and for the comfort of the survivors of this great disaster."

A summary of views of Army officers lead to the following five conclusions:

First, that the left rudder of the Roma gave way when she was less than half a mile from where she went down, near the army base fire station.

Second, that there was no fire on the ship until after the tilt began as a result of the right-hand side of the rudder going into an almost vertical position.

Third, that the craft became unmanageable as she swooped over the base reservation, narrowly missing a 150 ft. smokestack of the central heating plant.

Fourth, that the immediate cause of the explosion, with such force as to wreck the entire craft and set her on fire, was contact with a net of 2,200-volt high-power electric wires less than 100 ft. from where the Roma crashed into a pile of debris.

Fifth, that the Liberty motors, which were being tested, were not responsible for the disaster, unless something more tangible should be learned than appeared today.

The official list of the survivors dead and missing, at the time of going to press follow:

Identified Dead

First Lieut. William E. Riley, of 526 East Eighty-sixth Street, New York.

Missing

Majors John G. Thornell and Walter W. Vautsmeier; Captains Dale Mabry, George D. Watts, Allen P. McFarland and —— Dursehmidt; First Lieuts. J. R. Hall, C. Burns, Clifford E. Smythe, Wallace C. Cummings, Ambrose V. Clinton, and Harold Hine; Master Sergeants McNally, Murry and Gorby; Sergeants Harris, Hilliard, Beal, Yarborough, Ryan, Huffman, Schumacker, Holmes and Heveron; Privates Kingston, Blakley, Thompson and Hill. Civilians (all said to be of McCook Field, Dayton, Ohio): Stryker, Hanson, O'Laughlin, Merriman and Schulenberger.

Survivors

Capt. Walter J. Read, of Scarsdale, N. Y.; Maj. John D. Reardon, Washington, D. C.; First Lieut. Clarence H. Welch, of Papillion, Neb.; Lieut. B. G. Burt, pilot, slightly injured; Sergeants Harry A. Chapman, Virden T. Peek, Terra Haute, Ind., uninjured, Joseph N. Biedenbach, Akron, Ohio, Corp. Flores, Charles Dworack, McCook Field, Dayton, Ohio, Ray Hurley, of the National Advisory Committee on Aeronautics, uninjured, Walter A. McNair, of the Bureau of Standards, Washington, D. C.

History of the Roma

Construction of the Roma or T34 as she was then called, was started at the Italian Government Airship works at Rome in 1919. She made her first trials in the spring of 1920. The design is due to Messrs. Usuelli, Crocco, Prasone and other experts in the Italian Air Service. The Roma was a government built ship, in this respect the same as the ill-fated ZR2.

The Roma was used for various demonstration flights in Italy until last summer when she was purchased by the U. S. Army and disassembled for shipment to this country. It was reassembled at Langley Field, Hampton Roads, from which it made its first flight in this country, Nov. 15, 1921.

On Dec. 24 it flew to Washington and back under very adverse weather conditions and with motor trouble which finally put four of her six engines out of commission.

Soon after this the ship was put in "dry dock" and the whole power plant was changed from the original Ansaldo engines to Liberties. The disaster apparently occurred on the first flight after completion of this work.

Construction Details

The general dimensions and other characteristics of the Roma were as follows:

Type:—Semi-Rigid with rigid full length keel.
Volume ....1,200,000 cu. ft.
Length ....412 ft.
Diameter ...82 ft.
Original power plant:—Six 400 hp. Ansaldo engines (recently changed to Liberty engines).
Maximum speed: Supposed to be about 70 m.p.h.
Useful load: Approximately 40,000 lb. or 50 per cent of the gross lift.

For particulars respecting the theories followed in its design, see AVIATION for Dec. 12, 1921.

Methods of Air Navigation

Formula and Instruments for Checking Dead Reckoning Described

By Herbert V. Thaden

The science of air navigation has not until quite recently been given a great deal of consideration, owing to the fact that prior to the last three years no real demand or necessity existed for methods of true air navigation. For the comparatively short flights which were made over land, the method of pilotage, in which the airman flew a course between two places by his ability to recognize the intermediate ground features from a map, sufficed for all ordinary requirements. But when the event of long-distance flying became a reality and not merely a hypothetical possibility, when the Atlantic was spanned, and when numerous other long-distance flights over sea and unmapped land were being accomplished, then the airman immediately felt the need of methods by which he could obtain his position, other than by the recognition of terrestrial features. In the following paragraphs a few of the instruments and methods devised to attain this will be described.

The first and most important of all navigational methods is that of "dead reckoning." All other methods are supplementary to this one and are used only to check and correct it. The method in itself is extremely simple, consisting merely of plotting to scale on a map, the course and distance "made good" from some known and definite place. The distance "made good" is the actual ground covered and obviously equals the air speed of the craft plus or minus the effect of any existing wind. The deviating influence of the winds are the most important factor with which the navigator has to contend and it is essential that he be able to determine their magnitude and direction at all times during a flight. Fortunately, there are a number of methods by which this can be done with considerable accuracy.

Assuming a craft to be under the influence of two velocities, its own and that of the wind, then the resultant velocity will be the vector sum of these two quantities. As shown in Fig. (1), *ab* is the craft's velocity (air speed), *bc* is the wind

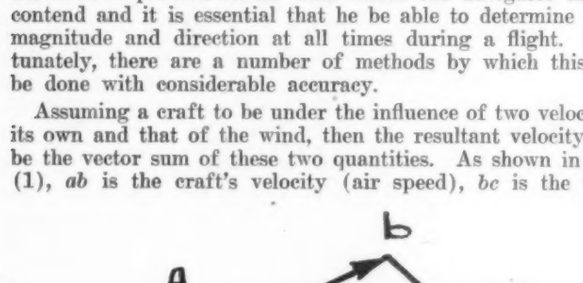


Fig. 1

velocity, and *ac* is the resultan velocity (ground speed made good). The ground, to an observer in the craft, is not passing by underneath parallel to the lubber-line (longitudinal fore and aft axis) but is apparently coming from a direction to starboard and passing at an angle θ to the lubber-line. The angle θ is termed the 'drift angle' and is measured in degrees to port or starboard. An instrument capable of measuring this angle is the Aero Bearing Plate shown in Fig. (2). The instrument consists of an annular ring graduated into quadrants and degrees like a compass card. A number of horizontal parallel wires are stretched across the open center and a small bead is mounted at each end of these wires. A vertical height bar, graduated in hundreds of feet, is hinged at the rear bead. To use the instrument as a drift angle indicator, the ground is observed directly below the craft through the open center. The annular ring is turned until the horizontal wires are parallel to the apparent line of motion of the ground objects. The angle then indicated between the wires and zero of the instrument is the drift angle, and, if this angle is applied to the compass course steered, it will give the course made good over the ground.

To obtain the ground speed made good, the eye-piece on the vertical bar is set on the graduated scale to the altitude corresponding to that of the aircraft. A foresight is taken

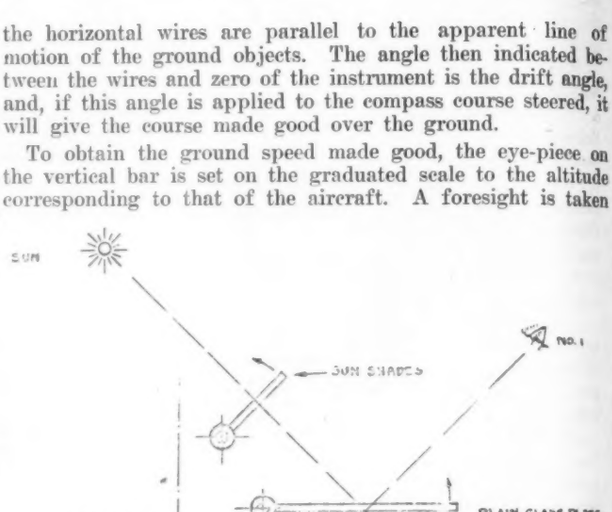


Fig. 6

on some ground object in the line of the actual track, by sighting through the eye-piece and pass the forward bead. With a stop-watch the time is noted from when this foresight was made until the craft passes vertically over the same object, as indicated by the ground object coming into alignment with the eye-piece and the rear bead. The ground covered depends on the distance between the two beads, and this distance is generally such that it represents a half mile on the ground. Dividing this base ground distance by the observed time of passage gives the ground speed. This method is only applicable at relatively low altitudes 2000 to 3000 ft., because the errors involved in sighting the ground object become proportionately greater with altitude and hence the accuracy is decreased.

A more accurate method of determining the drift angle, other than by observing vertically below the craft is to measure the horizontal angle of an object from the lubber-line some minutes after the craft has passed directly over the object. By taking a back sight on an object, over the tail of the craft in this manner, it is possible to reduce the errors of observation due to the roll and pitch of the craft. This back sight principle as well as other features are incorporated in the Wind Gage Bearing Plate shown in Fig. (3). The instrument was designed by Maj. H. E. Wimperis of the British Air Ministry and as described by him consists of a "bearing plate, the center of which is a glass panel marked with concentric circles corresponding to wind speeds by intervals of 10 m.p.h. Beneath the glass is a red wind point (*A*) mounted on the wind arrow (*B*) and is capable of sliding so that the red spot can be set to any wind speed by means of the circles. The wind arrow (*B*) is carried by the wind ring (*R*) and may be turned by knobs (*N*) beneath, so that it points to any desired direction relative to the bearing plate.

A drift bar (*D*) lies athwart the bearing plate, it comprises a central bar with speed and time scales, and a beveled edge for drawing drift lines on the bearing plate glass; also drift wires at the sides carrying Timing-beads. The drift bar is pivoted at one end to a nut. The position of this nut in its guides is adjusted by turning the handle (*S*) until the index points to the true air speed on the scale (*X*). The nut carries also a quadrant drift scale (*Q*) over which the tail of the drift bar moves, the pointer indicating the angle of drift. The height bar (*H*) is hinged at its base and when not in use is folded down. The slide (*C*) is movable on the height bar; its ring eye-pieces are used for observing the drift against the bead back-sight or along the drift wires, of any object over which the craft has some minutes previously passed."

When no ground object is available to sight, as when over water or a desert, a combination flare and smoke-bomb may be dropped overboard. This affords an excellent sighting point for either day or night use.

An alternative method of determining the ground speed, other than by the vertical height bar and timing beads is to measure the angle of depression, after a definite time interval, of an object (or flare) previously passed over. The depression angle, and the altitude are sufficient data to solve the right angle triangle and obtain the ground covered. This divided by the time interval gives the ground speed. Having thus determined the ground speed by any of the foregoing methods, the wind velocity and direction is obtained by drawing a vector diagram as in Fig. (1), in which the air speed and ground speed vector and the drift angle are known. The closing side of the diagram is the wind vector.

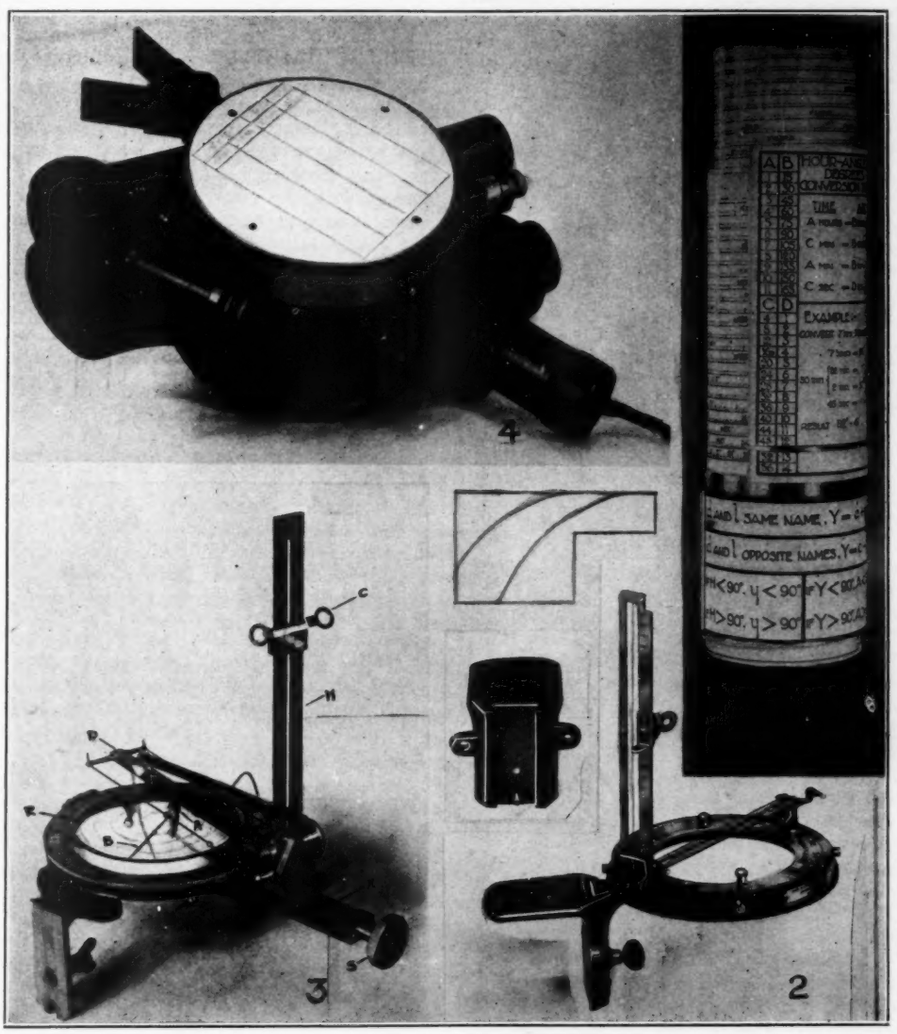


Fig. 2. Aero Bearing Plate. Fig. 3. Wind Gage Bearing Plate. Fig. 4. Bubble Sextant. Fig. 5. Bygrave Slide Rule

This method of determining the wind vector while perfectly simple has the disadvantage that quite a number of operations are necessary, some of which are subject to errors. The altitude of the craft, for example, which must be known in order to obtain the ground speed can, under certain conditions, be in error to the extent of 1000 ft. or more. That is, unless the altimeter is regularly adjusted to the changes in the atmospheric pressure as the craft progresses into new weather areas, and also to the changing altitude of the ground passed over. Other errors which are likely to affect the result are the personal errors in timing the passage of the ground object and graphical errors in the construction of the vector diagram. A method which obviates all of these disadvantages is the so-called "Wind Star Method" in which only the air speed, the course, and the drift angle on two separate courses need be known in order to find the wind vector. Either of the two instruments already described can be used but the Wind Gage Bearing Plate has the advantage that a necessary graphical construction can be accurately made directly on the glass bearing plate whereas with the Aero Bearing Plates the graphical construction must be done separately.

The method is as follows: while flying on a steady compass course the bearing plate glass is oriented so that its zero is pointing north. The nut (*S*) is turned until the index points to the true air speed. A back sight is made on some object previously passed over (determining the drift angle) and a line is drawn on the glass-bearing plate along the beveled edge of the drift bar (*D*). The course of the craft is then altered some 40 to 60 deg., the bearing plate is again oriented north and the other operations repeated. It will be found that the two drift lines intersect at a point and that a line drawn from this intersection to the center of the glass bearing plate is equal in length (same scale as the air speed) to the wind speed and that its bearing relative to the bearing plate zero is the true wind bearing. The concentric wind circles and the wind arrow (*B*) facilitate the reading of these values. It will be found on trial that all drift lines so obtained, irrespective of the course steered will intersect at one common point, called the 'wind point.' The appearance of these lines on the glass panel after three or more drift lines have been obtained is somewhat similar to that of a star; hence the name 'Wind Star Method.' The method gives very good results at any altitude and besides its distictive use in air navigation the method can be successfully applied at meteorological stations for accurately determining the winds at the various altitudes. Its one limitation in use, is when a continuous layer of clouds entirely obscures the ground. But even then a fairly good estimate of the wind above the clouds can be made by determining the wind just below the clouds from direct observations of the ground and then when above the clouds determine the wind relative to the clouds (observing cloud patches or spots). The vector sum of these two determinations gives a good ap-

proximation of the wind above the clouds relative to the ground.

Another method of determining the wind during a flight is by an analysis of a weather map. Previous to any flight of long duration the probable winds will be predicted by a study of the weather conditions along the route. Unfortunately the factors which govern the weather are not as yet well enough understood to predict with certainty two or three days ahead. Consequently the navigator must keep in wireless touch with ground observers along the route and all times be informed as to the location and paths of atmospheric "Highs" and "Lows." He can then keep his own weather map drawn up to date and from it determine approximately the wind direction and velocity.

Under normal conditions the method of dead reckoning navigation is sufficiently accurate to navigate several hundred miles, but on longer journeys over water or when no land marks are distinguishable it becomes imperative to have some means of checking the dead reckoning or "logged" position. This can be done in two ways, one by the traditional nautical method of astronomical observations, and the other by means of wireless direction finding. The first method, that of determining position by astronomical observations is a rather comprehensive subject and in this short article only a brief abstract of the method is possible.

Observations from the Heavenly Bodies

Every heavenly body has a point directly beneath it on the surface of the earth; this point being called its "geographical position" for that instant of time. The Nautical Almanac, a book published each year, contains the means of determining the location in the skies and hence the geographical position, of the sun, the moon, the planets and all the navigational stars, for any instant of time throughout the year. Thus, if we stood at the geographical position of a heavenly body, observing the body in our zenith, we could with the aid of the Nautical Almanac and a clock keeping Greenwich time, be able to determine our exact latitude and longitude on the surface of the globe. Obviously it is not always possible to find a heavenly body directly in the zenith, but if a heavenly body is observed anywhere in the skies and its altitude from the horizon measured with a sextant, we still could determine our position. By subtracting the observed altitude of the body from 90 deg. we obtain its zenith distance, that is, the angular distance between our zenith and the heavenly body. A little thought will indicate that there are an infinite number of places on the surface of the earth where the altitude of the heavenly body from the horizon would be exactly the same at any one instant of time. In fact the locus of these places is a circle about the geographical position of the body as a center and with a radius equal to the zenith distance. Therefore if we take a fairly large sphere of the world and on it plot the geographical position of the heavenly body and about this position swing a circle of radius equal to the zenith distance, we would obtain a 'position circle,' somewhere on which we must be located. This position circle in itself, however, does not aid us a great deal because its circumference is rather long and our dead reckoning position only indicates approximately our location on it. What is needed is another position circle or position line on which we also know ourselves to be located. Where this second position circle intersected the first would constitute a 'cut' and would definitely locate us. Now this second position circle can be obtained in exactly the same manner as the first, by making another observation on a different heavenly body. At night this is a simple matter because we have recourse to a large number of heavenly bodies, the moon, planets and all the stars. But during the day when only the sun is visible, it is necessary to obtain the second position line by some other means. This is most readily done by observing the bearing of some known wireless station and where this bearing line cuts the sun's position circle would be our location.

Another method is to make two observations of the sun, one in the forenoon and one in the afternoon. During the interval between observations the sun will have altered its geographical position by some 30 or 40 deg. So that by moving the forenoon position circle over by the amount of the estimated 'run' between observations a fairly accurate cut can be obtained with the afternoon position circle. The accuracy, however, will evidently depend on the accuracy with which the intervening run can be ascertained. So far we have been assuming that a large sphere of the world was available on which to draw the position circle. This, needless to say, is not feasible in practice. The sphere to obtain any accuracy, would have to be of considerable size and therefore maps and charts drawn on flat sheets of paper are used instead. For the convenience of the navigator in steering courses these maps and charts are usually drawn to Mercator's Projection. This projection is admirably suited for that phase of navigation but unfortunately is not at all suited for drawing 'Great' or 'Small Position Circles,' as these circles appear entirely distorted on this projection. Also, the scale of the charts is generally so large that it would be impossible to locate the geographical and the approximate dead reckoning position on one sheet of the ordinary size charts. To overcome these difficulties, the following procedure is ordinarily adopted in laying down position circles.

The altitude of the heavenly body for a certain instant of time is calculated, assuming that the observer is at the dead reckoning position. Then at the instant of time chosen, the actual altitude of the body is observed. If the observed value agrees with the computed value, we know that the assumed dead reckoning position lies on the true position circle. If the values do not agree, evidently the dead reckonings position has been assumed too near or too far away from the geographical position of the body; the amount in error being equal to the difference in degrees between the observed altitude and the computed altitude. Therefore, to draw the true position circle, it is only necessary to lay down the computed azimuth of the body, passing the azimuth through the dead reckoning position and on this line measure off the difference in minutes (1 min. = 1 nautical mile) between the observed and calculated altitudes. The direction measured being toward the heavenly body if the observed altitude is greater than the computed, and visa versa if less than the computed. A line drawn through this point, perpendicular to the azimuth will then be a portion of the true position circle on which the observer is located. It may be assumed for practical purposes that the small portion of the circumference of the position circle is a straight line for a distance of 20 minutes on either side of its azimuth. A position line so drawn is known as a 'Summer Line' and the distance between it and the dead reckoning position is called the 'intercept.' The intersection of the two Summer Lines or of a Summer Line and a wireless beacon ray would constitute a cut and furnish a check on the dead reckoning position.

Determining the Artificial Horizon

The only instrument used in making these astronomical observations has been a sextant. The type of sextant developed for sea use is not quite adaptable for air use, due primarily to the lack of a suitable horizon from which to measure an altitude, when flying over clouds. Below the clouds when the sea horizon is visible or above the clouds when they are of a uniform layer all at the same altitude, the ordinary naval type sextant can be used. But in hazy weather, or over mountainous country or over heaped up and broken clouds where there is no semblance of a well defined horizon it is impossible to obtain accurate observations with the naval type sextant. Two methods of obtaining an artificial horizon present themselves, one by means of a gyroscope and the other by means of a pendulum. The gyroscopic artificial horizon has not yet proven as satisfactory as the pendulum type. One of the first pendulum type artificial horizons consisted of a simple pendulum mounted on a gimbal bearing and with a flat horizontal mirror on top. The pendulum oscillations were partially damped by means of an oil dashpot, and when the machine in which the instrument was mounted was flown steady on an even keel, the flat mirror would define a reasonably horizontal plane. If the angle between the reflection of a heavenly body, as viewed in the mirror, and the actual body itself, were measured with an ordinary sextant, the angle would be found to be exactly twice the true altitude of the body from the horizon. In this manner the altitude of a heavenly body could be obtained irrespective of the condition of the natural horizon. This method of

obtaining the altitude, however, suffers from the disadvantage that two instruments are required and the total weight of these is necessarily high. An instrument which combines both of the previous instruments in one, and which is much lighter and more practicable, is the 'bubble sextant.' This instrument consists of an ordinary sextant on which is mounted a small gravity controlled spherical-bubble level. The bubble defines a vertical line (or a horizontal plane) from which angles can be measured.

The bubble sextant shown in Fig. (4) is a design of the Royal Aircraft Establishment. The principle of the instrument is shown diagramatically in Fig. (6). The bubble is projected through the prism and lens to a strip of plain glass plate where it can be viewed either by reflection or through the glass. When observing a star it is more convenient to observe the bubble by reflection and the star directly through the glass, while for sun observations the sun is more comfortably viewed by reflection on the glass and bubble directly through the glass. In making the observation the sextant is held so that the bubble is freely floating and the glass plate is rotated through a measurable angle until the bubble and the observed body coincide. A small electric light attachment enables the bubble to be illuminated at night. The size of the bubble can be regulated by a small hand screw. The focal length of the lens and the radius of curvature of the top of the bubble are both made equal to the distance between the bubble and the lens. Consequently the bubble is always in focus and appears to move with the observed body if the instrument should be rocked in the hand.

Accuracy of Observation

In flight, the most important factor controlling the accuracy of observations with this type of instrument is the condition of the air. On a calm day from an airplane the probable error of a series of six observations would be about 10 min. of arc, whereas on a 'bumpy' day the probable error might be as high as 30 min. of arc. Observations from an airship are much more satisfactory, the probable error coming within 5 min. of arc. These errors outside of the small portion due to instrument and personal errors, are caused by the effect of the lateral accelerations of the craft on the unbalanced mass of the pendulum (liquid below the bubble) causing the apparent vertical to shift.

The reduction of the astronomical observations is usually done by common logarithms using the principles of spherical trigonometry. The method is quite simple but somewhat laborious. A rather ingenious tubular slide rule known as the Bygrave Slide Rule, Fig. (5) was devised by the British Air Ministry to facilitate these calculations. By means of this slide rule ordinary spherical triangles can be solved with a comparatively high degree of accuracy in an appreciably shorter time than by logarithmic reduction. The rule is quite small and compact; about 2¾ in. dia. and 9 in. long.

The second method of checking the dead reckoning position is, as previously mentioned, by means of wireless direction finding. This method is a comparatively recent development and the results obtained so far have been extremely encouraging. In fact it is almost safe to predict that in the near future this method of obtaining position lines will be used not only by aircraft but also to a large extent by all seacraft.

Directional Wireless

There are three types of direction finding wireless telegraph (D.F./W.T.) which can be used by aircraft. The first type is that in which the aircraft is equipped only with an ordinary wireless set which he uses to call up two or more land stations equipped with D.F./W.T. requesting them to inform her as to the bearings of her wireless rays. Receiving this information she plots these bearings from their respective land stations and finds her location at the intersection of the lines. In the second type, the aircraft is equipped with a D.F./W.T. apparatus, and herself observes the bearings of wireless rays emanating from two or more land beacon stations. These land beacon stations send out at definite intervals, prearranged signals on certain wave lengths. Laying down these observed bearings from their respective stations as in the previous method, she obtains her position at the intersection of the lines. In the third type a specially equipped land station is capable of sending out a narrow directional wireless beam. This beam swings about the station in a clockwise direction with a constant angular velocity in much the same manner as a revolving beam of a lighthouse. As its beam passes through the zero or north bearing line a broad wave is sent out in all directions. If the angular velocity of the beam is known and the time is noted from when the broad zero wave is sent out until the beam passes by the aircraft (as denoted by the intensity of the signal) then this proportional time of the total time of revolution would indicate the proportional part of 360 deg. that the craft is relative to the station. For example if the beam had an angular velocity of one revolution every 360 sec. and the beam passed by the aircraft 270 sec. after the zero wave was transmitted, the navigator would know that he was exactly due west of the station. The only apparatus required in this method is an ordinary wireless receiving set and a stop watch. The stop watch can be checked by timing complete revolutions, and the bearings can be repeatedly checked by timing from subsequent zeros.

International Aviation Races in Italy

The Italian Minister of War has just approved a plan submitted by the Chief of Air Service (Comando Superiore di Aeronautica) for several big International Aviation Races and competitions to take place in September, 1922. The object of these competitions is to increase the creation and construction of new types of airplanes, and prizes will be taken from Air Service funds appropriated for that purpose.

The first race will be known as the "Grand Prize of Italy" and will be for airplanes. The prizes for this competition will consist of a Cup valued at 30,000 lire, a first prize of 150,000 lire, and a second prize of 50,000 lire. The second race will be known as the "Grand Prize of the Tyrrhenian Sea" and will be for seaplanes. In this competition the prizes will be of the same amounts as those for the "Grand Prize of Italy".

In addition to the prizes, 400,000 lire will be spent for the purchase of the Italian airplanes which make the best showing in these two competitions. As at present outlined, each race will be 2000 km. over a circuit not less than 500 km. in length. In addition to these two races, it has been decided to have parachute competitions, the descents to be made from airplanes. Prizes to the amount of 500,000 lire will be awarded in the parachute competitions, which will also be international. There will be held also a competition for free balloons, the money prizes in this competition amounting to 30,000 lire.

Italian Competition for Aviation Engines

The Chief of the Italian Air Service is organizing a large international competition for commercial aviation engines, to take place in the Fall of 1922 or the spring of 1923. Plans are being drawn up along lines already approved by the Minister of War. Money prizes from Air Service funds amounting to one million lire will be offered.

The large money prizes offered in this competition, as well as in those for airplanes, seaplanes, parachutes and balloons which are to participate in the big International Aviation Races and Competitions to take place in September, 1922, viz: the "Grand Prize of Italy" and the "Grand Prize of the Tyrrhenian Sea" are to be awarded to manufacturing houses. The Italian Air Service is very anxious for American manufacturers to compete in these events. Detailed regulations will be sent when completed and approved.

Spads at Ellington Field

A number of Spad 13's held in storage at the San Antonio Air Intermediate Depot are bing equipped with Wright 180 hp. engines for use of the First Pursuit Group at Ellington Field. These Spads are to be used by pursuit students as a step up to the MB3, which will be available shortly.

Success of the Air Mail Service

An Unparalled Service Record Maintained at Comparatively Low Cost

By Otto Praeger

The situation of the U. S. Air Mail Service at this time is one grave concern. It has suffered on the one hand a refusal of the House of Representatives to vote an appropriation for its continuance, and on the other hand it faces the advent of a new Postmaster General and a new Second Assistant Postmaster General, who, should congress finally decide to make an appropriation, will have to shape the policies and administer the service.

The situation is one that cannot be helped by partisan disparagement of previous efforts, for whatever antagonism there may exist in congress toward the Air Mail does not arise out of partisanship, but out of perhaps undue conservation or lack of information. I know, because I successfully put through democratic and republican congresses three Air Mail appropriations, the largest, one for $1,250,000, being obtained from a republican congress for a democratic administration. All that was required was to show how the last appropriation was spent and what the government got for the money. All that congress desired to know was that the service was administered as economically and as efficiently as it was possible to do with the character of equipment available, and that the government's investment really benefitted commercial and military aeronautics. It was a business proposition with congress and was decided by records and reason.

If an appropriation is to be obtained for the Air Mail for the next fiscal year, it can not be obtained by disparagement or appeal to partisanship but by constructive argument, based on the splendid record of the Air Mail to date. The Air Mail has been in continuous operation since May 15, 1918. In that time congress has appropriated $2,300,000 and this was supplemented by allotments authorized by congress out of other funds to the extent of approximately $900,000, making the total amount expended under my administration about $3,200,000.

Out of this money we had to construct ground terminals, including hangars, shops, etc., and erect ten radio stations with towers to cover the service from coast to coast. Regular and emergency fields had to be prepared; larger and more modern planes than were available from the army or navy had to be purchased and approximately 200 war planes had to be converted from fighting to commercial planes at an average cost of about $1,200 per plane. In a number of instances cities furnished fields or hangars or both, but in almost every case we had to take out of the Air Mail fund for drainage, construction of runways and roads, or for building additional shops or hangars as much as the value of the donations.

The total outlay for new planes, reconstruction of war planes, preparing of terminals for the routes between New York and San Francisco, Minneapolis and Saint Louis, and New York and Washington aggregated about $1,440,000, of which more than $1,100,000 was spent with the aircraft industry for planes, reconstruction and accessories. This left approximately $1,760,000 for maintaining finally eighteen flying fields and operating one round trip daily (holidays excepted) over the following distances and periods of time:

Between New York and Washington, 200 miles about three years.

Between New York and Chicago, 750 miles, about two years.

Between Chicago and San Francisco, 1,900 miles, seven months.

Between Minneapolis and St. Louis, 600 miles, seven months.

The economy that had to be exercised to conduct a forced daily service with that sum of money for such a period and over such an expanse of territory must impress any one familiar with flying operations as effectively as it did impress congress which critically examined the details of our operations in connection with each years appropriation before voting funds for the service.

As to the efficiency of the Air Mail in those trying first three years of its existence, here is the record covering the 34 months of my direction of the service: Twelve months, 95 to 100 per cent; five months, 90 to 95 per cent, making seventeen months with a record of 90 per cent up to 100 per cent. The average performance for the entire period was better than 81 per cent.

Unfortunately there have been such casualties in connection with the operation of the Air Mail as are inseparable from any bold, pioneering venture; yet, at that, the record of the Air Mail per 1000 miles of operation shows fewer casualties than obtained in England or Canada over a corresponding period.

Such is the service that has been built from the ground up in three years and that demonstrated what could be done with the airplane in the way of maintaining a dependable daily service in spite of very excellent opinion that it could not be done.

Add to the record of the Air Mail in its formative period the unparalleled results obtained by the present administration during the past summer and fall, and we have an argument more convincing and more apt to succeed with congress than a campaign of disparagement or appeal to political partizanship.

Bombing Pilots Graduate at Kelly Field

Thirty-three officers and six cadets successfully completed the course of training for bombardment pilots conducted by the 2nd Bombardment Group at Kelly Field, San Antonio, Texas, and graduated on Dec. 22, 1921. Captain Arozarena of the Cuban Air Force and Lieutenant Brown of the Argentine Navy were numbered among those who successfully completed the prescribed tests. Captain Arozarena immediately departed for Cuba, promising to remember all his friends at Kelly Field. Lieutenant Brown is leaving for London, England where, in company with other officers of the Argentine Naval Forces, he will inspect and test Avro seaplanes which his government is purchasing. Upon completion of this duty, these officers will return to New York and perform like services in connection with the purchase of F5L seaplanes in this country. Lieutenant Brown has been in the Government Aviation Schools in the United States for two years, having first received training on seaplanes at the Naval Aviation School, Pensacola, Fla., then primary training on land planes at Carlstrom Field, with advanced training on same at Kelly Field.

Safety on European Airways

R. H. C. Noorduyn, of Netherlands Aircraft Mfg. Co., New York, calls our attention to the article by Capt. de Lavergne in AVIATION of Feb. 6 in which the statement is made that the Latecoere lines are, with the Aeromarine Airways, the only ones which have so far operated without an accident. Mr. Noorduyn wishes to state in this connection that the Dutch K.L.M. lines, which have been running between London and Amsterdam and Amsterdam and Hamburg during the last two years, have also a clean record in this respect. During 1921 the Fokker F3 monoplane used by that company carried their passengers a distance of over 400,000 miles in comfort and security.

Mather Field recently received a large new radio outfit, consisting of a Navy Vacuum Tube Transmitting set, with two 80 ft. steel towers. When set up it will have a daylight range of 1250 miles, continuous waves, a 250 mile daylight range for wireless telephone and 1250 mile daylight range, continuous waves, for buzzer modulation.

Considering the Passenger's Comfort

Practical Suggestions for Overcoming Noise and Vibration and Providing Heat and Ventilation

By W. D. Beatty

Some interesting views concerning passenger requirements on commercial airplanes were expressed in a paper read by Wing Comdr. W. D. Beatty before the Royal Aeronautical Society on Jan. 5, 1922. Parts of the paper are reproduced below.—EDITOR

First and foremost among the important items affecting comfort I would place silence. A "desirable attribute" in 1912, it has never yet been attained in normal practice, and the air line passenger still suffers acute discomfort from the noise to which he is subjected.

It is true that the noise in a machine comes from a variety of sources, but it is urgent that some at least should be eliminated. Promising exhaust silencers have appeared experimentally; it is for designers to incorporate them in their designs. Never should an open exhaust point in the direction of the cabin. Get rid of the barking roar of the exhaust, and it becomes possible to identify and so eliminate the other noises. Probably modifications in the design of propellers may be desirable, and with a silent exhaust it becomes an easier matter to compare the noise effect of two different propellers. Fabric covered fuselages must also, I think, be relegated to the past; a stiff wooden covering does not transmit to the interior of the cabin the blows from the slipstream in the same way that fabric does.

Vibration and resonance are closely allied to noise in effect on passengers, and should be eliminated. It may be necessary on these grounds to ensure that the two engines of a twin-engined machine never synchronise. I believe Colonel Bristow is trying experiments on these lines. Engine designers will need to utilize motor-car experience, and get rid of that variety of noises from gears and other moving parts which at present are so obvious in an aero-engine when its exhaust does happen to be silenced.

Importance of Ventilation

The next important detail which designers should carefully study is that of ventilation, to which very little attention has hitherto been given. Adequate ventilation of the cabins of commercial aircraft is a problem that presents considerable difficulty. The cubic space available is very limited, so that the air inside the cabin tends to become vitiated rapidly, while the speed of the machine is such that the velocity of incoming air is often so high that the passenger feels a draught. In rough weather, therefore, the unfortunate passenger tends to suffer from depression, headache, cold and illness.

For many years the efficiency of ventilation has been determined by the quantity of carbon dioxide present in the atmosphere. The supply of air generally recognized as necessary to remove all sensible impurities amounts to 3,000 cu. ft. per hour per person. In a present-day cabin of 300 cu. ft. —seating ten passengers—the air must be changed 100 times an hour if the standard allowance is to be provided. In practice, such a rate of change is unobtainable, except in unbearably draughty conditions. It is clear then that the measurement of the CO_2 content is likely to continue to be unsatisfactory. Prof. Leonard Hill, however, has pointed out that the 3,000 cu. ft. figure can be much reduced if the cooling, drying and radiant energy conditions are satisfactory. To afford a means of determining these conditions he invented the "Kata" thermometer. Experiments have shown that the information given by this instrument is an accurate guide to the adequacy of the ventilation so tested, and if its readings average between six and eight the conditions may be considered satisfactory. Now the cooling and drying effects of air depend largely upon its rate of movement, and it may be taken that if the temperature of the air is 55 deg. to 60 deg., its velocity at the inlet to the cabin should not exceed 4½ ft. per sec., if the inlet is 18 in. or more from the pasenger, or 3 ft. per sec. if it is less than 18 in. from the passenger.

With inadequate warming arrangements, a change of air more frequently then three to five times an hour is likely to be uncomfortable in the normal cabin, and under such conditions it may be found necessary to keep the velocity of in-coming air down to 1½ to 2 ft. per sec. The velocity of out-going air may be as much as 10 ft. per sec. at the orifice, particularly if that is at least 18 inches from the passenger. Designers should, I think, aim at providing for some twenty changes per hour, taking care to avoid draughts and make satisfactory heating arrangements. If it is found that the air is being changed too rapidly for comfort, it is a very simple matter to close up some of the openings. It is far more difficult for the user of the aircraft so to alter it as to increase the regular supply of air if the original arrangements have proved inadequate.

Now, how is the air to be changed? Experiments in America on sleeping cars showed that, provided the foul air was expelled, an ample supply of fresh air found its way through cracks and crevices in a swiftly moving vehicle. Personally, I think it better to arrange for the removal of the foul air than to trust to luck to its finding its way out. It should be practicable to design suitable aspirators to draw the air from the cabin of an airplane—slightly above the floor level, for, though hot air rises, vitiated air tends to descend. It is probable that air entering through cracks and crevices will do so at such a velocity as to be a source of discomfort to passengers, particularly as its temperature is likely to be low. Air inlets should, therefore, be arranged at the front of the cabin, somewhat below the roof; the velocity of air entering here can readily be governed by the insertion of right angle bends in the trunks leading to the inlets; each such right angle bend reducing the total flow by 50 per cent.

It must be remembered that it is essential that the incoming air should be free from impurities, due to exhaust gases, gasoline fumes, stale oil, and so on. Special arrangements for the aspiration of the air from the engine compartment—which should in any case be bulkheaded off from the passenger cabin—may be of value in preventing leaks of impure air into the cabin.

Temperature of the Cabin

Heating is closely bound up with ventilation, and at the temperature likely to be met with in ordinary flying, it is essential that arrangements should be made for warming the cabin. It is possible to arrange for a supply of air heated by the exhaust pipes, but it should be remembered that air that has been in contact with metal heated to some 200 deg. C., is definitely unsuitable for breathing. If a muff on the exhaust is used, it should therefore be stepped up, the in-coming air for the cabin being taken from the outer step.

Some of you, however, may remember the footwarmers which Cody fitted to his machine, heated from a bye-pass off the engine cooling system. While there are objections to the introduction of such complications in a matter so important as the running of the engine, no serious difficulty should be experienced in fitting a hot water or steam heating system which draws its heat from the exhaust. Such a system, once developed experimentally, should prove very satisfactory and require little or no attention, while its weight ought not to be excessive.

A suitable arrangement for ventilation and heating might be as follows:—At the forward end of the cabin fresh air enters at the rate of 3 ft. per sec., through an inlet about 12 in. by 12 in. in size, slightly below the roof. Aspirators, arranged below the seat level at the back of the cabin,

suck out the vitiated air. An exhaust heated tubular boiler supplies steam or hot water to a radiator fitted two or three inches in front of the fresh air inlet, and the same heating system includes footwarmers in the cabin floor. Such an arrangement should imply fresh air, warmth and comfort for the passengers.

The form of construction of the cabin directly affects its warmth, and from this point of view the fabric-covered cabin is very bad. With this material radiation to the outer air is so rapid that adequate warming in cold weather is almost out of the question. Seats.—However, I must return to the subject of passengers' comfort, and I wish to say a word or two about seating accomodation. It always seems to me that chair designers work entirely by tradition, and that if any scientific study of the subject has been made, no attention has been given to the conclusions reached. If the tires on the wheels of a motor-car are too small the vehicle is uncomfortable to ride in, and the tires wear out rapidly. Similarly, if the weight of one's body is carried by a small portion of it, that part quickly gets fatigued and the whole body feels uncomfortable. Only too often seats are designed so that an unnecessarily small portion of one's anatomy bears the majority of the weight. Why should not designers study the problem carefully in conjunction with anatomists and produce a light chair properly designed to suit the human form and to keep the loading per sq. in. of flesh at a low figure.

Exiled Avros Find Homes

Trading in job lots of airplanes has become a highly exhilirating winter sport. One recent deal involves several angles of interest. The planes in question have been involved in numerous suits and countersuits, plots and counterplots. The machines are Avros with Clerget engines. They were tarned out by British constructors on war contracts to the design and specifications of A. V. Roe. Roe, however would not own them for his own offspring. In 1919 he sought by injunction to restrain the British Aircraft Disposal Board from disposing of them as Avros. Large numbers were, however, sold by the Disposal Board, whether or not as Avros is not a matter of record for the moment.

Beginning with the heralded arrival on these shores of a shipload of the identical machines they were known as Avros. Then the American custodians of the Wright patents established successfully in Court their right to collect a royalty on each of these machines sold. This charge on being passed on to the customer had the effect of lessening the demand for the fatherless Avros.

Some, however, were held by the U. S. Government for nonpayment of customs. Then, in the latter part of 1921, the Government, disregarding or unconscious of the legal decision of its judicial branch upon the Wright patents, to defray the customs charges, sold at auction in Brooklyn 96 of the Avros at an average price of $75 each. This it will be noted is rather a moderate price as junk values run. But when it is also considered that these machines had never been out of their crates; that each was equipped with an unused Clerget engine; that each was also accompanied by an additional unused Clerget in an unopened tin lined case; that two new engines and one plane, all in perfect condition were sold for $75, it is apparent that the Customs Department were poorly informed about the lure and romance of the air to say nothing of the cost to the British public in taxes of this lot of orphaned airplanes.

The purchaser of 96 of these Avros, each with a spare engine, at the rate of $75, was Isreal Ludlow, operating as Associated Motors. Under the latter name there blossomed forth in the New York papers on a recent Sunday a large ad informing the public that a perfectly good lot of Avros were again for sale at a price. Wm. Davis of Hasbrouck Heights, N. J., with considerable experience in marketing ex-war machines, immediately secured from Mr. Ludlow, at a price forty of the Avros each with its spare engine. Mr. Davis in turn has disposed of twenty-six of these machines at a very handsome profit, while other lots have also changed hands one or more times. Proving conclusively that there *is* such a thing as commercial aviation if you properly commercialize it.

More Liberal Contract Policy

It will be of interest to the aeronautical industry to know that the Air Service has made a change in its policy in regard to its dealings with the industry. Circulars issued Jan. 31, 1922, request designers to submit designs of desired types of airplanes and to accompany their drawings with their estimate of the cost and time of constructing one and two such airplanes experimentally. No competitive bids on this construction work are invited for the reason that competition in price is impracticable where such competitor would bid on his own design.

From among the designs submitted the government will select the three which are the most satisfactory, all things considered. Each of the three designers thus selected will be paid the amount indicated in the circular, competitors for these payments being limited to those, who, in the opinion of the Chief of Air Service, possess sufficient facilities and competent personnel properly to perform an experimental construction contract.

The practice which the government expects to follow is to select one or more of the designs submitted under each circular and to place an experimental construction contract with the designer for one or two airplanes of each design. The price to be paid will be a matter of negotiation between the government and the designer, thus eliminating to a very large extent wasteful competition. Should any airplane produced under such experimental contract prove worthy of reproduction, and should the government decide to reproduce it, it is proposed to endeavor to reach an agreement with the original maker for such experimental airplanes for further production without calling for bids. The government reserves the right to call for competitive bids for such airplanes, however, should it be unable to reach an agreement as to price, but in such an event if an award is made to one not the original maker, the government proposes to pay the latter a royalty consisting of a fixed sum per airplane, such royalty, however, not to exceed $1000 per airplane nor to total more than $50,000.

This new policy is a marked step in advance. It will increase, if not restore, the incentive for engineering development, as under it substantial encouragement is given designers and experimental constructors to produce airplanes which may be adopted by the government for production. Under the new policy, a designer will know that if his airplane is actually put on a production basis, he will either receive the production contract or in lieu thereof a royalty for each such airplane produced by others for the government.

The Flying U Activities in Texas

Commercial aviation activities in the State of Texas, early recognized as an ideal territory for all-the-year flying, are again on the up grade, judging from a report received from The Flying U School of Aviation, of San Antonio.

Along with the several army fields at which commercial fliers are welcome, private or municipal fields have been established at San Antonio, Dallas, Houston and several other places. These are properly marked and equipped with hangars, gas and oil.

For the past two years the Flying U organization has been active in interesting Texas cities in municipal landing fields and aerial police reserves. Dallas, Houston and one or two other cities now have regularly organized aerial police who serve without pay and supply their own ships.

Besides conducting an aviation school, the Flying U, of which ex-army pilots Jake Underwood and P. G. Boren, are the principals, are rebuilding for commercial work various types of planes purchased from the Government. These include DH4B's, JN's, Spads, SE5's, Fokkers, Sop Camels and Standards.

The Standards, rebuilt as 3 and 4-place ships with 150 or 180 hp. Hisso engines and DH landing gear have proven particularly efficient for photographic and passenger carrying work in the Southwestern climate and also of special advantage in the mountainous sections of northern Mexico.

Flying Boat Traffic Increases Florida

Aeromarine Airways Carrying Passengers from All over the World

Florida has become the center of flying boat operation in the United States, according to reports issued by C. F. Redden, President of the Aeromarine Airways, Inc. The largest number of passengers transported by this Company in one day was forty-six persons.

Of the whole number transported, 16 were carried from Key West to Havana, a distance of 100 miles—flying time 75 minutes; 10 from Miami to Key West, 5 from Key West to Miami, 175 miles—flying time 112 minutes; 12 from Miami to Bimini and return, a one way distance of 45 miles—flying time 40 minutes; and 3 from Miami to Nassau a distance of 187 miles—flying time 120 minutes.

No person of the total number was counted twice. This sets a new daily record for aerial transportation as a mode of travel.

These Florida operations by the Aeromarine Company are doing more than anything else to establish commercial aviation in America. The passenger list reads like Who's Who in America and the countries represented cover almost the entire world.

Bankers who recently made a record flight of 70 minutes from Key West to Havana in an Aeromarine boat. L. to R.: Percy Rockefeller, W. G. Brady, R. L. Farnham, E. P. Swenson, Guy Carey, C. E. Mitchell, Lee Olwell and F. Rodriguez

Among the prominent passengers carried during this season from January 1 to February 12 were Charles E. Mitchell, President, National City Bank, Percy G. Rockefeller, E. P. Swenson, Chairman of the Board of Directors of the National City Bank, W. G. Brady, R. L. Farnham, Guy Carey, also Directors of the National City Bank, and Lee Olwell, Assistant to President Mitchell, Mr. and Mrs. Fritz Kreisler, Prince Antoine Bibesco of the Rumanian Legation of Washington, D. C., E. M. Statler of hotel fame, Signor Rivero, owner of the Dario de la Marina, one of the largest Cuban newspapers, Mae Murray, motion picture actress, R. Sills, New York produce merchant, C. A. Briggs, well known cartoonist and his wife, H. W. Lowe, Director of Johnson and Higgins, R. G. Menocal, son of the former president of Cuba, Captain Boring, Aid to Governor of Nassau, Mayor Oles of Youngstown, Ohio.

The daily reports show that people from the following countries and cities have flown since Jan. 1: New York City; Baltimore, Maryland; Havana, Cuba; Mexico City, Mexico; Panama, R. P.; Toronto, Canada, San Jose, Costa Rico; Mobile, Alabama; Elkins, West Virginia; Sacramento, California; Memphis, Tennessee; Hamilton, Ohio; Roselle, New Jersey; Philadelphia, Pennsyvania; Cambridge, Massachusetts; Daytona, Florida; Bogota, Columbia; Andover, Massachusetts; Washington, D. C.; Milwaukee, Wisconsin; Harrisburg, Virginia; St. Louis, Missouri; Chicago; Illinois; Tampa, Florida; Iquique, Chile; Norwalk, Connecticut; Little Rock, Arkansas; Boston, Massachusetts; Perth, New Brunswick, Canada; Wyomissing, Pennsylvania; Denver, Colorado; Nassau, Bahama Islands; Joliet, Illinois; Kansas City, Missouri; Hollywood, California; Jacksonville, Florida; Los Angeles, California; Dallas, Texas; Nashville, Tennessee; Charleston, South Carolina; Greenfield, Massachusetts; Springfield, Illinois; Rodsville, Connecticut; Marion, Tennessee; Cleveland, Ohio; Aurora, Illinois; Detroit Michigan; Shreveport, Louisiana; Hartford, Connecticut; Worcester, Massachusetts; New Rochelle, New York; Salt Lake City, Utah; Thomasville, Georgia; Marinetta, Wisconsin; London, England; Paris, France; Noroton, Connecticut; East Orange, New Jersey; South Orange, New Jersey; Newark, New Jersey; Bayshore, Long Island; Elkhart, Michigan; La Grange, Illinois; Indianapolis, Indiana; Bayonne, New Jersey; St. Paul, Michigan; Buffalo, New York; Olean, New York; Charleston, West Virginia; Nelight, Nebraska; Burlington, Vermont; Bridgeport, Connecticut; Hazelton, Pennsylvania; Greenwich, Connecticut; Montgomery, Alabama; Yongstown, Ohio.

Many passengers registered from their hotels making it impossible for the passenger agent to determine their home town.

The Aeromarine fleet in active operations (not counting those held in reserve) consists of the following eleven passenger twin Liberty motor flying cruisers: Santa Maria, Nina, Columbus, Balboa, Ponce de Leon, Mendoza, and the following five passenger single Liberty motor, open cockpit flying boats: Pennsylvania, New York, Miami, Florida, Virginia, New Jersey, Presidente Zayas.

Before the opening of the Florida season, C. F. Redden realized that adequate facilities for the sale of the Aeromarine

flying boat tickets had to be made. As a result, nearly every large city in the United States has one or two sales agents. Central distributing bureaus are continually sending out new Aeromarine air travel literature. Postal cards showing aerial views seen by Aeromarine flying boat passengers are distributed free at the various Aeromarine flying boat bases and are very much in demand.

The success of Aeromarine operations in Florida, in view of the fact that this company is the largest company in the world operating flying boats exclusively, means that commercial aviation in America is receiving its biggest boost.

The record for safety in passenger carrying established during the first year of operation is being maintained, thus proving that over-water travel is absolutely safe when conducted in a safe and sane way.

Boston to Have Airport

The first concrete step toward acquiring a Boston airdrome was taken recently when the Boston Chamber of Commerce following a comprehensive study of the question, filed in the Massachusetts Legislature a bill authorizing the State Department of Public Works to contract and lease to the United States Government an airplane landing field on the Commonwealth flats in East Boston near Governors Island. The measure also seeks to appropriate from receipts in the Port of Boston Fund $35,000 for the purpose of preparing the field.

After negotiations, covering a period of several years, among aviation exponents and city and state officials, the airmen finally feel that the public is coming to realize the value of aeronautics to Boston. A municipal landing field first came under consideration when Major Leonard H. Drennan was in charge of the air service in the First Corps Area. He conceived the idea of establishing an airdrome on the Strandway. This would have been an excellent location, but the city authorities declined to sanction the project on the ground that the site chosen was needed as a playground. The problem was still hanging fire when Maj. Edwin B. Lyon succeeded Major Drennan. Major Lyon thought favorably of some reclaimed land in South Boston and personally interviewed John N. Cole, Metropolitan District Commisioner, regarding the possibility of converting this land into a modern airdrome. Mr. Cole deemed this impossible. Major Lyon then turned his attention to East Boston, and, in his own words, picked a site that would be "the best in the country." With clear approaches and with facilities for hydroplanes, the East Boston project, if favorably acted upon, will assure Boston an airdrome of the most modern type and also blaze the trail for an aerial mail line to that city.

The aeronautical equipment, including hangars, etc., now at Framingham, would be transferred and it is hoped that the Government would furnish still further paraphernalia. To insure adequate control, the field would be under the management of the United States Army, with the understanding, however, that commercial planes and civilian pilots in general will be permitted to fly there.

It is the aim of Major Lyon and those closely associated with the proposed airdrome, to construct two runways at right angles, 1500 by 100 ft. The site covers an area of about 3000 ft. by 3000, and it is not unlikely that a direct automobile road to Boston proper would be established, always providing the Legislature adopts the chamber's bill.

Under this bill the Department of Public Works is authorized to construct the field and lease it to the federal government at a nominal annual rental, and is also permitted to lease additional land for erection of hangars, and other facilities for the use of commercial and civilian fliers. There is no doubt but that the field would stimulate commercial companies. There are a number of former Army pilots living in Boston who are anxious to take up the new industry, but who have been "anchored to the ground," owing to the cost involved in buying and equipping a suitable airdrome. If the United States is not to grant subsidies, and incidentally many airmen are opposed to this European plan, the United States Government and state and city authorities can at least advance aeronautics by furnishing airdromes, which are to aviation what harbors and railway stations are to steamships and trains. Airmen often refer to the fact that automobile companies were not obliged to construct and finance State highways, yet without these the older industry would have faced the same situation that is now confronting the commercial aviation company.

Despite the lack of outside aid, which is all the more apparent when this country's policy is contrasted with the European situation, an American aircraft company, operating a moderate-sized fleet of eleven passenger airplanes, last year carried more than 6800 passengers and flew over 95,000 miles without a single accident. The United States air mail service has twenty-one planes in the air every day, covering a daily distance of 5360 miles. Between July 1 and Oct. 31 of last year, the planes flew 529,777 miles out of a possible 536,210 scheduled—a performance of 98.8 per cent, at an average cost of 75¼ cents a mile. In addition, planes have saved large tracts from forest fires and are now engaged in spraying infected trees from the air.

U. S. Chamber of Commerce Backs Aircraft Legislation

The Aeronautical Chamber of Commerce, in cooperation with the National Aircraft Undewriters Association, has been in close touch with the Chamber of Commerce of the United States. At the last general meeting of the Chamber of Commerce of the United States at Atlantic City, aeronautical resolutions were presented at the instance of the National Aircraft Underwriters Association. The Chamber of Commerce of the United States too now have recommended these resolutions to the National Directors for favorable consideration. The report follows:

"The Department of Transportation and Communication has transmitted to the Board of Directors for its consideration a number of recommendations in connection with Aeronautic legislation. The Department Committee believes that Aviation is a national American institution, in origin and principle, and should continue as such. In practical development commercial aeronautics is now suffering from the results of wartime specialization and over-production. Through lack of legal and economic status it is not receiving the practical encouragement it deserves, not only as a most powerful arm of quick national defense, but also as a new transportation agency of great potentiality. Properly developed and articulated with present transportation systems this new agency can become a most valuable addition to the Nation's specialized carrier capacity in peace as well as in war. Recent hard experience in hurriedly training an adequate flying corps emphasizes the great need of a sufficient reserve available for any national emergency. At present, nation-wide regulative legislation is greatly needed, not only for the ordinary needs of public safety, but also to establish the legal status and responsibilites of air transport in national and international business. Canada, Australia and European nations have already provided such legislation. Without practical encouragement, commercial aeronautics in America will continue to lag behind foreign development to such an extent as to constitute a menace to future security and to delay fatally that essential commercial development in which America should rightly stand first.

"Therefore the Committee has recommended that the Board of Directors consider favorably the resolutions presented to the Ninth Annual Meeting by the National Aircraft Underwriters' Association, urging immediate support of legislation providing for an appropriate aeronautical code. Such legislation should be broadly conceived in the nature of an enabling act providing for the adoption, enforcement and the improvement from time to time of the Aeronautical code under proper government authorization created by the Act.

"That the Directors advocate the creation of a Bureau within the Department of Commerce for the development and regulation of commercial air transport operations in interstate and foreign commerce; intra-state operations and legislation to conform as nearly thereto as possible.

"That the Directors authorize such timely public utterances by the Department and Executives as can be made through the proper channels with the object of encouraging the early consideration of this essential aeronautical legislation."

Senate Passes Bureau of Aeronautics Bill

The Bill to create a Bureau of Civil Aeronautics in the Department of Commerce after many revisions passed the Senate on Feb. 13. Much confusion has been created by the different names under which similar bills have been designated and by the radical changes made in these bills while in committee and under debate. In the Senate the bills have been sponsored by Senator Wadsworth and in the House by Representative Hicks.

The bill, while it does not provide for as many matters as was desired, will centralize the regulation civil governmental aeronautics and encourage commercial aviation. It is unfortunate that the salary of the Commissioner of Civil Aeronautics was reduced from $7500 to $6000 for the qualifications of such a man must be very high. With the amount of responsibility placed on a commissioner of a bureau which regulates and licenses such a technical branch of transportation as aviation, it is hoped that the salary may be increased before the Bill is finally passed.

The Bill will now be considered by the House Committee on Interstate and Foreign Commerce and after being acted on by the House of Representatives go to a conference committee. In this procedure, many changes can be made and it is hoped that many persons will write to Mr. Hicks and give him the benefit of their suggestions.

AN ACT to create a Bureau of Civil Aeronautics in the Department of Commerce, to encourage and regulate the operation of civil aircraft in interstate and foreign commerce, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of Commerce be, and he is hereby, authorized to establish in the Department of Commerce a bureau to be knwon as the Bureau of Civil Aeronautics.

SEC. 2. That the word "aircraft" as employed in this Act shall embrace every type of flying machine, conveyance, or vehicle now known or hereafter invented, devised, or developed, whether or not used in the carriage or transportation of persons or property, or without persons or property, flown, operated, or navigated in or through the air, and that the term "civil aircraft" as employed in this Act shall embrace all forms of aircraft except those operated by the Army and the Navy.

The term "commerce" when used in this Act means the flying, navigating, or operating of any civil aircraft in interstate or foreign commerce, or in, over, or through the District of Columbia, the Territories, dependencies, reservations, national parks, or over any place or building over which the United States has jurisdiction.

Organization and Duties

SEC. 3. That there shall be at the head of such bureau when established a Commissioner of Civil Aeronautics, who shall be appointed by the President, by and with the advice and consent of the Senate, who shall receive a salary of $6,000 per annum. There shall be also a chief clerk of said bureau who, in addition to the usual duties of a chief clerk, may act as commissioner, under the direction of the Secretary, and such other deputies, assistants, and employees as may be required from time to time, and for which appropriations shall have been made, and the Secretary of Commerce may, at any time, utilize the services of such officers or employees of any other bureau or division of the Department of Commerce as he may deem necessary in the administration of this Act, or he may take from such bureaus or divisions such parts thereof as he may deem advisable to create the Bureau of Civil Aeronautics or to consolidate such parts with that bureau.

SEC. 4. That it shall be the duty of the Secretary of Commerce, in conformity with the provisions of this Act, to foster civil aviation in every way possible and to do all things necessary therefor, cooperating or consulting with all other established governmental agencies, Federal or State, and taking advantage to the fullest degree possible of the facilities they can offer. This shall include the following duties:

(a) To inspect, in order to safeguard life and property, all aircraft before it is used in commerce and certify as to its condition, capacity, and safety at the date of inspection, and to make the information contained in such certificate available to the public in such manner as he may prescribe.

(b) To establish aerial traffic rules and regulations for the manner of navigating and operating civil aircraft in order to safeguard life and property.

(c) To investigate and recommend air routes.

(d) To encourage the establishment of landing fields and air stations.

(e) To make recommendations to the Weather Bureau as to the necessary meteorological service.

(f) To study the possibilities for the development of civil aviation in the United States and to collect and disseminate information relative thereto.

(g) To investigate, record, and make public the causes of accidents in civil aviation.

(h) To exchange with foreign Governments through existing governmental channels information pertaining to civil aviation.

(i) To operate and for this purpose to purchase, when appropriations shall have been made to do so, such aircraft as the Secretary of Commerce may deem necessary for inspecting, licensing, regulating, and controlling the operation of civil aircraft, and for determining air routes, landing fields, and air stations, Government machines to be used if possible and the consent of the department having control of the same can be secured.

(j) To prepare and maintain a comprehensive survey and inventory of all industrial and civil aeronautical resources under the jurisdiction of the United States. The Secretary may direct the Commissioner of Civil Aeronautics, or any other officer or employee referred to in Section 3, to perform any or all of the aforesaid duties.

SEC. 5. That for the purpose of making effective the provisions of this Act the Secretary of Commerce shall direct the Commissioner of Civil Aeronautics to provide regulations, which shall become effective upon the approval of the Secretary of Commerce, for the following:

(a) Licensing pilots and such other persons engaged in commerce as may be required for the public safety and upon good cause the suspension or revocation of such licenses.

(b) The registration, identification, inspection, and certification of all civil aircraft in commerce.

(c) The registration, identification, inspection, and certification of all civil landing fields or air stations used in commerce.

SEC. 6. That no civil aircraft shall be used in commerce unless owned by a person who is a citizen of the United States or its dependencies, and in the case of a partnership unless each member is such citizen; *Provided*, That in the case of a corporation or association no such aircraft shall be owned by such corporation or association unless the president and board of directors or the managing officers thereof, as the case may be, are citizens of the United States and the corporation or association itself is organized under the laws of the United States, or of a State, Territory, District, or possession thereof, and 75 per centum of the interest therein is owned by citizens of the United States.

Rules and Regulations

SEC. 7. That all rules and regulations authorized under the provisions of this Act shall, by the direction of the Secretary of Commerce, be formulated by the Commissioner of Civil Aeronautics after consultation with other established governmental agencies concerned, and upon the approval of such rules and regulations by the Secretary of Commerce they shall be promulgated by him and shall have the effect of law and be enforceable from the date of such promulgation unless otherwise provided therein. The Secretary of Commerce shall have the power to suspend or revoke such rules and regulations and to alter or amend the same and promulgate new rules and regulations, such alterations, amendments, and new rules and regulations not to take effect until at least six months shall have elapsed, and to take such steps as he may deem necessary to bring such changes to the notice of those affected.

SEC. 8. That, by the direction of the Secretary of Commerce, the Commissioner of Civil Aeronautics shall, after consulting with other departments of the Government concerned, establish the conditions in order to safeguard life and property under which persons may be carried and property imported and exported in civil aircraft in commerce, and to prescribe the areas within which aircraft entering the United States, its Territories and dependencies, or the waters thereof, are to alight and the conditions to be complied with by such aircraft, which shall become effective upon the approval of the Secretary of Commerce.

SEC. 9. That the same rights, privileges, and treatment shall be accorded to alien pilots operating foreign aircraft in this country which the country of that alien extends to our pilots operating their machines in such country, except that any prohibition against our licensed pilots shall apply to such alien pilots.

SEC. 10. That it shall be unlawful for any licensed pilot to guide or control any aircraft, while engaged in commerce, in a manner designed to give a demonstration of trick flying or aerial acrobatics or to divert the aircraft from a normal flight.

SEC. 11. That it shall be unlawful to use any civil aircraft in commerce except in conformity with the provisions of this Act and such rules and regulations as may be promulgated pursuant thereto.

SEC. 12. That any violation of the provisions of this Act, or of any rule or regulation promulgated in conformity therewith, shall be punishable by a fine not exceeding $500 or by imprisonment for a term not exceeding six months, or both.

SEC. 13. That the Secretary of Commerce and such assistants as he may designate shall have power to conduct hearings, to subpoena witnesses, to send for documents and other papers, to administer oaths, and to take such testimony as may be necessary in determining the qualifications of individuals for licenses or registration certificates to operate aircraft or in the suspension or revocation of such licenses or registration certificates, or to enable him, or them, to make effective any of the provisions of this Act, or any rule or regulation promulgated in conformity therewith.

SEC. 14. That the Secretary of Commerce is authorized to fix the fees and charges for such inspection, registration, and licensing authorized by this Act to cover the cost thereof, which fees and charges shall be collected by the Secretary of Commerce and covered into the Treasury of the United States to the credit of miscellaneous receipts.

Cooperation with Aircraft Owners

SEC. 15. That for the purpose of encouraging the development of civil aviation in the United States, full cooperation shall be given by the Secretary of Commerce to the owners or operators of civil aircraft, and that the Secretary of War, the Secretary of the Navy, the Secretary of the Treasury, the Postmaster General, and the Secretary of Commerce may, in cases of emergency, sell to any owner or operator of civil aircraft landing on an air station or landing field under their respective jurisdiction, aviation fuel, oil, supplies, and provide necessary mechanical services of an emergency character, under such regulations as they may approve and promulgate for their respective services. The proceeds from such sales shall be deposited in the Treasury of the United States to the credit of the appropriations involved.

SEC. 16. That the Secretary of Commerce shall publish annually a bulletin setting forth all licenses issued or revoked, together with field reports of all flying activities, accidents, and field and route data, under the control of the bureau.

SEC. 17. That the Commissioner of Civil Aeronautics shall annually, at the close of each fiscal year, make a report to the Secretary of Commerce, giving an account of all moneys received and disbursed by him and describing the work done by the bureau, and the Secretary of Commerce shall transmit such report to Congress with the annual report of the Department of Commerce.

SEC. 18. That all salaries provided herein and all expenses incurred under the provisions of this Act shall be paid out of such money as may be appropriated therefor by Congress, and such appropriations as may be needed to carry out the objects and purposes of this Act are hereby authorized.

SEC. 19. That the Secretary of Commerce be, and he is hereby, authorized to make such additional rules and regulations as may be necessary to carry out the provisions of this Act.

SEC. 20. That if any portion of this Act be declared invalid, it shall not affect any of the other portions thereof, which other portions shall continue in full force and effect.

SEC. 21. That this Act shall take effect immediately, and all Acts or parts of Acts inconsistent herewith are hereby repealed.

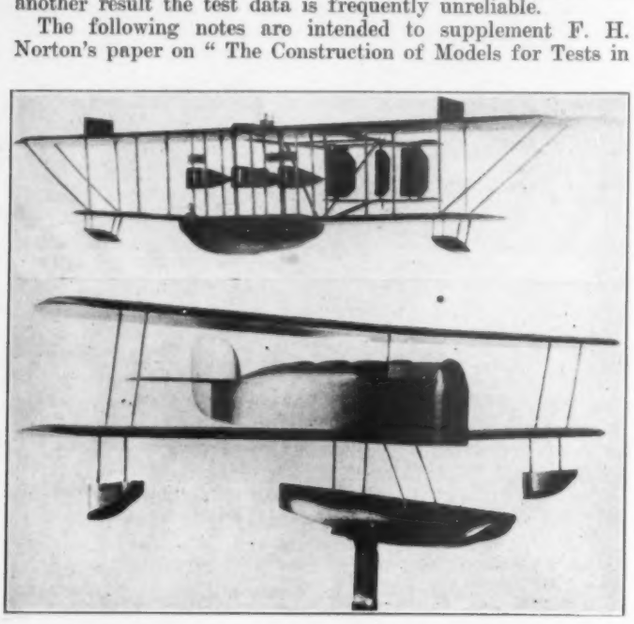
Construction and Testing of Model Airplanes

More Accurate Results Obtained by Omitting Scale Struts, Wires and Fittings

By Walter S. Diehl

In most wind tunnels the construction and test of a model aerofoil or fuselage is standardized, but in the endeavor to secure a non-turbulent air flow and great refinement in force measurements, the general requirements for construction and tests of model airplanes or seaplanes have been neglected. The average airplane model is constructed to scale from general assembly plans with detail depending on the skill of the model maker. As one result the cost of a model is very high. As another result the test data is frequently unreliable.

The following notes are intended to supplement F. H. Norton's paper on " The Construction of Models for Tests in



Scale Models: Upper Fig. 1. Lower Fig. 3

Wind Tunnels" (National Advisory Committee for Aeronautics' Report No. 74). It will be shown that the construction of an airplane model can and should be simplified in order to obtain the most reliable test data.

General Requirements in Model Construction

The general purpose of the usual wind tunnel tests on a model airplane is to obtain the aerodynamic characteristics, the static balance, and the efficiency of the controls for the particular combination of wings, tail surfaces, fuselage and landing gear employed in the design. These parts must be exact scale reproductions. Any appreciable variation from scale reproduction must be in the remaining parts of the model, i.e., struts, wires, fittings, control horns, radiators, engines and the various attachments found exposed to the wind in special airplanes.

Obviously the wings, tail surfaces, fuselage and landing gear must be rigidly held in the proper relation, one to another, preferably with means for minor adjustments. These requirements are easily met in models of internally-braced monoplanes, but they usually cause trouble in models of multiplanes, particularly when an attempt is made to provide an *exact scale reproduction* of the interplane bracing in accordance with the popular conception of model requirements. Although model struts and fittings are very minute and difficult to make, their use would be justified if a model so constructed was rigid and capable of minor adjustments and if it in test fairly represented the full scale airplane.

Interplane Bracing

Fig. 1 represents an average attempt to secure an exact scale reproduction in a wind tunnel model. The result is a flimsy affair which is not only difficult to line up, but also difficult to keep adjusted. The values of drag obtained from tests are from 20 per cent to 50 per cent higher than the values obtained from calculations, which allow for a normal scale effect. This great difference in drag is due to the abnormal scale effect for struts and wires at low values of VL. Fig. 2 is included to illustrate the magnitude of this scale effect. The average full scale strut, say 2 in. thick at a velocity of 100 f.p.s., has the following characteristics:

$$VL = 16.7$$
$$D_c = 0.042$$

For a 1/24 scale model tested at 50 f.p.s., the characteristics will be

$$VL = \frac{16.7}{24 \times 2} = 0.35$$
$$D_c = 0.180$$

Consequently, the resistance of a model strut is about four times as great as its proportional full scale value.

The scale effect on wires and cables is about one-half of the scale effect on struts. The scale effect on fittings is unknown, but it is reasonable to assume that it is of the same order as that for the wires. It therefore appears useless to employ an exact reproduction of the interplane bracing on models. This fact has been recognized in the construction of certain models, in which, according to the test reports, the omission of interplane wiring was supposed to allow for the scale effect on the struts. This assumption is hardly justified in general use although it may give a fair approximation in those cases having a certain degree of balance between the struts and wires. Even with this simplification there still remains the requirements of rigidity and minor adjustment which are always difficult to meet with the model streamline struts.

As the result of investigations made at the Washington

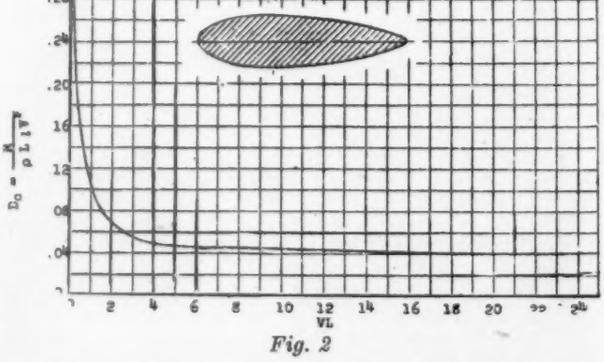


Fig. 2

Navy Yard wind tunnels and extending over a period of three years, it has been concluded that the best results are obtained by omitting all of the struts, wires, and fittings, as such, and holding the model together with the fewest possible number of small cylindrical brass struts consistent with rigidity and adjustment. These struts are usually fitted in symmetrical pairs without reference to the location of struts on the full scale airplane. It is found that three pairs are sufficient for the average biplane model. Adjustment is obtained by fitting the struts with R.H. and L.H. threads into corresponding bushings in the lower and upper wing. The diameter of the wire used depends upon the size of the model and varies

from 0.030 in. to 0.100 in., the average being approximately 1/16 in.

Tests have shown that the lift of these wires is negligible and that their drag is substantially constant over the usual range of flying angles. A very close approximation to the true model scale drag of the airplane may therefore be obtained by correcting the observed model drag for the difference between the drag of the cylindrical struts and the scaled down value of the calculated drag for the full scale interplane bracing, i.e.

where $D^1 = D - D_w - D_e$

D^1 is the corrected model drag,

D the observed model drag,

D_w the drag of the cylindrical struts

used on the model, and D_e the calculated model equivalent on the full scale interplane bracing drag, assuming that it varies as $(VL)^2$. Since this assumption is always made in converting the model test data to full scale values, the preceding operation is, in effect, the equivalent of a scale correction for the interplane bracing.

Corrections may also be made to pitching moments if desired. It is recommended that in each case the moment of $(D_e - D_w)$ about the c.g. be compared with the total moment in order to weigh the necessity of this correction. In most cases it may be neglected.

Minor Details

The construction of the model may be further simplified without affecting the accuracy of the test results. For instance, the control cables, and in most cases the control horns, should be omitted and their resistance included in the correction D_c.

Radiators have approximately one-half of the resistance of a flat plate of equal frontal area. Free air radiators may therefore be approximated by a flat plate whose linear dimensions are 70 per cent of those of the radiator. In case there are objects in the wake of the radiator it is desirable to use a piece of gauze which has a resistance coefficient equal to radiator core. Nose radiators should be made according to the method described in N.A.C.A. Report No. 74.

Very little detail should be used on engine cylinders, wind shields, wing skids, tail skids, shock absorbers, etc. These parts have very little effect on the total resistance and it has been found that the extra labor required to put in the detail is not justified.

Fig. 3 represents the appearance of a model which embodies in its construction the foregoing simplifications. This model is rigid and easily adjusted; on test it gives satisfactory results. The cost of construction is reduced approximately 50 per cent compared with an exact scale model.

—*Technical Note No. 82 N.A.C.A.*

Notices to Aviators

Issued by Hydrographic Office, U. S. Navy

Missouri

Fulton—Landing field.—The Henderson-Mauldin Aero Service report the establishment of a landing field 1½ miles east of Fulton, Mo. The field is 2600 ft. long, north and south, and 2000 ft. wide, and is marked by a hangar with circles and wind bag. The field is level, sandy, hard and dry, and covered with short grass; altitude 800 ft. above sea level; prevailing winds north and south.

Obstructions consist of a row of trees along the north fence, scattered trees along the east side, low telephone wires along the south side, and fence and two trees on the west side.

Oil and gas on the field; hangar space for two transient planes.

Address Walter F. Henderson or Leslie W. Mauldin for further information. (N. A. 12, 1921.)

New York

Albany.—Seaplanes can land at Albany in depth of 11 ft. at low water, mud bottom; rise and fall of tide 2.9 ft. Landings may be made above and below Albany; beaching facilities only fair.

Supplies of all kinds are available.

Ships should take off south of Albany; taxi to plenty of water.

NOTE.—Albany is on the west bank of the river 125 miles from the Battery, and 24 miles from Hudson, a small village below Albany.

New Rochelle.—Seaplanes can land at New Rochelle in depth of 10 ft., mud and gravel, with beaching facilities on the bathing beach.

Obstructions:—Numerous small craft anchored.

Landmarks:—Two flagpoles, two chimneys, and white church steeple; lighthouse.

Supplies of all kinds can be procured.

NOTE.—This is a good anchorage in all kinds of weather.

East Quogue, Long Island.—Seaplanes can land at East Quogue in shallow water with poor beaching facilities (can not approach within 100 ft. of beach); bottom not good.

Obstructions:—A few pier stakes and small sailing vessels.

Landmarks:—Town of East Quogue, East Quogue Hotel, Coast Guard stations 73 and 74, Shinnecock Lighthouse.

Supplies and repairs ½ mile.

Clifton, Rosebank, Stapleton, Tompkinsville, St. George.—Seaplanes can land off the above villages on Staten Island in depths of 22 to 75 ft., soft mud bottom, with good beaching facilities; rise and fall of tide 4.5 ft.

Obstructions:—Steamers and sailing vessels will be at anchor but there will be lots of room for landing and take-off.

Landmarks:—Stapleton Pier; Fort Wadsworth Lighthouse, red brick, 2000 yd. below Rosebank.

Supplies of all kinds may be obtained.

NOTE.—Coming up the Narrows on the left hand is a red brick lighthouse (Fort Wadsworth); 2000 yd. farther up is town of Rosebank; 1100 yd., Clifton; 1200 yd., Stapleton; 1200 yd., Tompkinsville; 800 yd., St. George. (N. A. 10, 1921.)

Saratoga Springs—Aviation field.—Mr. Hiram C. Todd, of Saratoga Springs, N. Y., reports that a municipal aviation field has been established about 3 miles northward of that city. The field, which is within easy walking distance of a trolley line, is marked by a 100 ft. circle and the initials "S.S." The ground is level and well adapted for the use of large as well as small planes. A gasoline station is located on one corner of the field and the clubhouse of the McGregor links is a few hundred yards distant.

The field is open to all visiting aviators. (N. A. 10, 1921.)

New Jersey

Landings for seaplanes.—The commanding officer, United States Naval Air Station, Rockaway Beach, Long Island, reports that seaplanes can land at the following places:

Keyport.—Seaplanes can find a landing at Keyport, on Raritan Bay, in from 3 to 4 ft. at mean low water, gravel and mud bottom; rise and fall of tide 5 ft. There is no beach.

Landmarks:—Aeromarine airplane factory.

Supplies at Aeromarine factory.

Storm warnings are displayed at Keyport.

In taking-off taxi beyond bar.

(See Notice to Aviators 3 of 1921.)

Pleasure Bay, Long Branch.—At Pleasure Bay good landing for small planes may be found, depth of water 10 ft. in the channel; rise and fall of tide 1½ ft.; bottom mud. There are no beaching facilities.

Landmarks:—Long Branch Steamship Co.'s building with red roof, Coast Guard Station 101.

"Who's Who in American Aeronautics"

(Copyright, 1921, by The Gardner, Moffat Co., Inc.)

The biographical sketches of men who are prominent in American Aeronautics are printed periodically in AVIATION. The first series will be shortly published in a more durable form, and revised issues will be published semi-annually to take care of the frequent changes in station of Army and Navy officers, and such other changes as may occur. As errors and omissions are liable to occur in a compilation of this character, interested parties are requested to notify "Who's Who" Editor of the necessary corrections so the record may be kept up to date.

Henry A. Bruno

BRUNO, HENRY A., Commercial Aviation; born, London, England, Feb. 7, 1893; son of Henry A. Bruno and Annie (Thompson) Bruno.
Educated: Portland (Prep.) College, London; Montclair, N. J. High School.
Professional: 1914-1915, Advertising Manager, Montclair Herald; 1916-1917, Advertising Manager, American Press, New York; 1919, local Sales Manager, New York City Car Advertising Co.; 1920, Manufacturers Aircraft Association; 1921 to date, Sales and Advertising Manager, Aeromarine Engineering and Sales Co., New York, Aeromarine Airways, Inc.
Aeronautical Activities: 1909, Built and flew world's smallest monoplane glider; 1910-1911, designed, constructed and flew man carrying gliders and motor driven monoplane; 1917, aviation R.F.C., Canada; 1920, assisted in handling publicity for American Aircraft Companies through Manufacturers Aircraft Association; 1921, handled flying boat sales through United States; demonstrated flying boats, made first complete aerial circumnavigation of the Great Lakes.
War Service: January 1917, organized New Jersey Division British American Brigade; pilot, R.F.C.
Books: "The Flying Yankee".
Member: Old Colony Club; American Legion; Hartford Yacht Club (Conn.); Aeronautical Chamber of Commerce.
Present Occupation: Sales and Advertising Manager, Aeromarine Engineering and Sales Co., Aeromarine Airways, Inc.
Address: Times Bldg.; home, Westover Court, 210 West 44th St., New York City.

James H. Knight

KNIGHT, JAMES H., Air Mail Pilot; born, Lincoln, Kans., March 14, 1892; son of Dr. M. M. Knight and Emma S. Knight; married, Lois Warnock Hoag, Aug. 18, 1919.
Educated: Buchanan public schools; Michigan State College, Mechanical Engineer.
Professional: Mechanical Engineer with Contracting Engineers, 1914-1916; 1916-1919, Lieutenant in U. S. Army Air Service; 1919 to date, Pilot, flying for U. S. Air Mail Service.
Aeronautical Activities: 1916-1919, U. S. Army Air Service; commercial flying, Ed. Stinson Aircraft Co. and U. S. Air Mail Service, 1919 to date. (Speed records and transcontinental night flight, Cheyenne to Chicago, Feb. 1921.)
Flying Rating: Reserve Military Aviator, Aug. 1918; Aero Club of America License No. 2052.
War Service: As above.
Member: Aero Club of America; Aero Club of Cleveland.
Present Occupation: Air Mail Pilot.
Address: Ak-Sar-Ben Field; home, 709 S. 18th St., Omaha, Nebr.

Dean C. Smith

SMITH, DEAN C., Air Mail Pilot; born, Cove, Ore., Sept. 27, 1899; son of J. Cull Smith and Rhoda B. Smith.
Educated: Public schools of Oregon; two years in college.
Aeronautical Activities: Enlisted, A.S.S.C., July 1917; Gossport Instructor's School, Aug. 1918; instructor till Jan. 1919; Pursuit School, Rockwell Field, March 1919; Air Mail Pilot, 1920 to present date.
Flying Rating: Reserve Military Aviator, July 3, 1918.
War Service: July 1917 to April 1919.
Member: Aero Club of America; Air Mail Pilots Association.
Present Occupation: Air Mail Pilot.
Address: Air Mail Field; home, 144 S. 38th St., Omaha, Nebr.

Frank Simpson Whiting

WHITING, FRANK SIMPSON, Bond Business; born, Somerset, Ky., Dec. 4, 1893; son of Harley E. Whiting and Ada A. (Simpson) Whiting; married, Dorothy Cooper, May 27, 1919.
Educated: Public schools of Chicago; S.B. 1916, University of Chicago.
Professional: Automobile Blue Book Publishing Co., 1915-1916; E. H. Rollins & Sons, 1917-1920; A. B. Leach & Co., 1920-1921.
Aeronautical Activities: Ground School, Champaign, Ill., June, 1917; England, Aug. 1917 to May 1918; at front with 98th Squadron, Royal Flying Corps, May 1918 to Sept. 1918; Executive Officer, Ellington Field, Nov. 1918 to Jan. 1919.
Flying Rating: Reserve Military Aviator, March 23, 1918.
War Service: Army, May 1917 to Jan. 1919.
Member: Chicago Athletic Association, Chicago, Ill.
Present Occupation: Whiting & Co. Investment Securities.
Address: 105 S. LaSall St.; home, 2219 E. 70th St., Chicago, Ill.

Burr Horton Winslow

WINSLOW, BURR HORTON, Air Mail Pilot; born, Horton City, Pa., June 15, 1892; son of Orin S. Winslow and Minnie (Horton) Winslow.
Educated: Public schools.
Professional: Lumber business from 1910 to 1915; insurance and mining, 1915-1917; oil business, 1920.
Aeronautical Activities: Enlisted U. S. Air Service, May 1917; cadet training at S. M. A. Cornell University; flying training at Call Field; instructor at Post Field eight months; discharged at San Francisco Presidio, Sept. 1919; Air Mail Pilot since Oct. 1920.
Flying Rating: Reserve Military Aviator, Sept. 1918.
War Service: As above.
Member: Aero Club of America; Air Mail Pilots Association.
Present Occupation: Air Mail Pilot.
Address: c/o Air Mail Service, Reno, Nev.; home, Brockport, Pa.

Richard Reginald Blythe

BLYTHE, RICHARD REGINALD, Commercial Aviation; born, Wapella Saskatchewan, Canada, Feb. 8, 1894; son of G. Percy Blythe and Margaret Louise Blythe.
Educated: 1906-1913, Victoria High School and "Westward Ho" College, Edmonton Alberta Canada.
Professional: 1916, Manager, Morrison Garage Co., Santa Barbara, Calif.; partner, Blythe e Hijo Automobile Accessory Imports to Cuba; 1917-1918, Public Accountant, Deloitte Plender Griffiths & Co., Havana, Cuba; 1919-1920, Travelling Auditor Cuba Cane Sugar Corp.; 1920 to date, Aircraft Insurance Manager, Johnson & Higgins, New York.
Aeronautical Activities: Represented Aircraft Insurance Brokers of New York on Aerial Demonstration Flights over New England during March to July 1921; Official Insurance Observer on first aerial circumnavigation of Great Lakes; Aeronautical Investigator, Lloyds Insurance Co. of London, England.
War Service: Canadian Infantry 50th Gordon Highlanders, Feb.-Dec. 1915; Royal Air Force, 1918.
Member: Country Club of Havana; American Club of Havana; Aloha Club of California; Aero Club of America.
Present Occupation: Aircraft Insurance Manager, Johnson & Higgins, Insurance Brokers.
Address: 49-51 Wall St.; home, Westover Court, 210 West 44th St., New York City.

James M. Johnson

JOHNSON, JAMES, M., Commercial Aviation; born, Helena, Ark., July 19, 1885; son of James B. Johnson and Belle T. Johnson; married, Cornelia Spencer, June 25, 1912.
Educated: Public schools of Oberlin, Ohio; private school in Helena, Ark.; B.S. in Mechanical Engineering, 1907, Purdue University, Lafayette, Ind.
Aeronautical Activities: Learned to fly at Curtiss Aviation School, North Island, Calif., 1914-1915; instructor for Curtiss School at North Island, 1915-1916; instructor for Curtiss School, Newport News, Va., 1916-1917; test pilot for Government at Langley Field, June 1917 to Oct. 1917; test pilot, commercial aviation, Johnson Airplane and Supply Co., April 1921 to date.
Flying Rating: Aero Club of America Certificate No. 329, June 23, 1915; Aero Club of America Expert Aviators Certificate No. 78, March 21, 1917.
Present Occupation: Johnson Airplane and Supply Co.
Address: 1024 Creighton Ave.; home, 714 Creighton Ave., Dayton, Ohio.

George William Maxim

MAXIM, GEORGE WILLIAM, Commercial Aviation; born, Hallowell, Me., May 16, 1894; son of Bradley C. Maxim and Almeda (Keith) Maxim; married, Laura Willock, July 14, 1920.
Educated: Public schools.
Professional: Machinist, 1911 to 1917, 1919 to 1920; commercial aviation, 1920 to 1922.
Aeronautical Activities: Oct. 1917 to Dec. 1918, flying training at Ground School of Military Aeronautics, Princeton, N. J., Park Field, Love Field, Gerstner Field, Rockwell Field and Mitchel Field; Jan. 1919 to Nov. 1919, machinist at Curtiss Airplane factory, Garden City, L. I.; May 1920 to Nov. 1920, pilot for Waterbury Aviation Co., Waterbury, Conn.; May 1921 to Dec. 1921, pilot for Maxim Air Service Co., Waterville Me.
Flying Rating: Reserve Military Aviator, April 4, 1918.
War Service: Army, Sept. 1917 to Dec. 1918.
Member: Aero Club of America.
Present Occupation: Commercial aviation.
Address: 5 Oak St., Waterville, Me.

Howard A. Scholle

SCHOLLE, HOWARD A., Attorney at Law; born, New York City, Sept. 12, 1885; son of Samuel Scholle and Estelle (Content) Scholle.
Educated: Sachs School, New York City; A.B. 1906, Williams College; LL.B. 1912, Columbia University.
Professional: 1907-1909, Smelting business; 1912-1914, Law.
Aeronautical Activities: Officer in Charge of Balloons and Assistant Supply Officer, Army Balloon School, Fort Omaha, 1917; Air Division, Signal Corps, Washington, 1918; Supply Officer, Balloon Detachment, Commanding Officer, 29th Balloon Company, President, Preliminary Aviation Examining Board, Fort Monroe, 1918; Attached to Office Chief of Army Balloon Inspection, 1918-1919, member, Contest Committee, Balloon Committee, Airways and Maps Committee and Library Committee, Aero Club of America.
Flying Rating: Free Balloon Pilot, Certificate No. 675, Aero Club of America.
War Service: 1st Lieut., Air Service, Aug. 1917 to Feb. 1919.
Member: Aero Club of America; Williams Club; University Club (Salt Lake City).
Address: 11 East 76th St., New York City.

Vigilance Committee Warns Investors

Reports on Promoters Efforts to Sell Stock in Aircraft Schemes

The following statement has been issued by the National Vigilance Committee of the Associated Advertising Clubs of the World.

It has come to the attention of the National Vigilance Committee that various professional promoters are active in many sections of the country, either in the sale of shares in air transportation companies, promising large returns to investors, or setting up machinery which will enable them at some later date to sell interests in such companies.

In some instances, promoters have gathered around them men of some aviation experience, who have thus far enjoyed good reputations, and have with the names of these men and their past aviation experience bought or borrowed respectability to create confidence without which the professional promoter is lost.

In other instances, promoters have forwarded their plans for separating gullible citizenship from its savings by the hurrah method of trading upon the community spirit of cities solicited to provide station sites and franchises that will "put them on the air transportation map" and inspire the envy of some less fortunate rival city. This may lead to the appointment of an "aeronautics committee" of the Chamber of Commerce to work for the coming of ships of the air—a form of recognition which amounts to endorsement. With news items in the local press, this provides the "set-up" upon which promoters' agents will cash in when stock-selling time rolls round, as it inevitably does.

Claims are Deceptive

Promoters of this type are as bold as they are resourceful. Not only do they fairly ooze "facts and figures" about aeronautics of which the "prospect" knows nothing and which are used to mislead, but also they snare his savings by firing his imagination with the romance and glory of this new art and industry which national defense has brought so prominently to the fore. They intimate that Chambers of Commerce are financially backing their efforts; that rich capitalists are advancing all the money needed to do preliminary organization work; that profitable contracts with the Post Office Department and the Express Companies are practically in their pockets; and they talk glibly of "government cooperation," and "official connections." These, and many other representations which dazzle even skeptical City Fathers, have in them more of deception and fraud than of truth and honesty.

Some of these promoters, bolder perhaps and more versed than others in the art of large-scale fakery, claim to possess planes, often juggling with the names of famous designers in a way to impress the layman. Such promoters may even have a plane or two—built to order, of course, for stock-selling purposes—but not fitted for freight and passenger carrying service at a profit. In this connection, however, it should be remembered that promoters who have attained the rank of "professionals" do not make the mistake of having no goods to show when they launch a stock-selling campaign. Pandolfo built motor cars at "Pan-Town-on-the-Mississippi" and the fradulent Emerson Motors Company of New York had a real factory.

Pubic Confidence Imperiled

Commercial aviation has a bright future in America. But it is a future which must be realized by the sane, clear-headed men in industry and finance. There is no need to rush it. Haste means waste. It means public confidence undermined by unrealized hopes of promise-fed investors. Wildcatters who would sell huge issues of stock without making clear to the investing public that it takes a long chance on such enterprises in this undeveloped field of air-travel are certain to injure seriously the development of the industry.

Such promoters are insincere or worse. They are not entitled to public confidence. They have little to lose but their time. Their gains roll high with the sale of stock, out of which they reward themselves richly, not only by means of liberal commissions on the sale of stock, but by organization and pre-organization expenses and various other remunerative "costs" which the "investors" and not the promoters pay.

Furthermore, even honest air-transportation projects, from the viewpoint of investors, must necessarily be considered in the extremely speculative class until there is adequate Federal legislation regulating travel by air. No such legislation exists now and until it is enacted the public had best refrain from attempting flyers in such ventures. The enthusiasm and energy which Chambers of Commerce may devote to putting their communities "on the air map" can find safer and more profitable exercise than through advancing the plans of the air route promoter who has scant respect for legal safe-guards and regulations. It is desirable that municipalities set aside landing fields for public use but they should be wary of extending exclusive privileges to stock-selling schemers.

The Industry's Future

Commercial aviation—the great, new development in transportation—is being put forward soundly by men of experience in aeronautics and the automotive industry who have their feet on the ground. It should not be permitted to become a means by which weavers of fantastic schemes may enrich themselves at the expense of a public whose admiration and enthusiasm for a marvelous development make them easy victims for persons of predatory instincts.

To prevent exploitation of the credulous public and consequent vital injury to an important, promising industry, honest business men and reputable publications are urged to act:

First:—By following the advice:
"Before you Invest—Investigate."

Second:—By reporting doubtful schemes to
the National Vigilance Committee,
110 West 40th Street, New York City.

Japanese Officers Visit Mitchel Field

Col. M. Fuki, Col. Y. Arakiki, Maj. T. Watanabe and Maj. N. Tanifuji, of the Imperial Japanese Army, recently were guests of the Commanding Officer of Mitchel Field, Maj. W. R. Weaver, and made an inspection of the post.

Air Service Mechanics School in Full Swing

At the present time there are 257 students entered in the various courses of the Air Service Mechanics School at Chanute Field, Rantoul, Ill. The majority of these men were enlisted in the recent recruiting campaign. A total of 511 men are now awaiting instruction, and within a week sixty of these will be placed in school. The remainder will be undergoing instruction within four months.

There are now two foreign officers attached to the school for instruction, viz: Lieut. Guillermo C. Friele of the Army of Ecuador and Lieut. Guillermo Martull of the Army of Cuba. First. Lieut. Henry Cooper Zuniga, Air Service, Army of Chile, was graduated from the Officers' course in Engine and Plane Maintenance on January 13, 1922. He is to return to Chile shortly. Lieutenant Zuniga has been at Chanute Field for the past four months and has made many army friends during that time.

Foreign News

France

It is reported that among the extensions planned by French air lines companies during the coming year is that by the Compagnie Messageries Aeriennes of their London-Paris service to Marseilles. At present Paris is not linked up by air to the south of France, travelers having to proceed to Toulouse by train. If the new line is established it should make a very considerable reduction in the time taken to get to the Riviera via Marseilles. It may also link up with the Latécoère lines to Morocco.

Great Britain

Tests of fuel tanks entered for the Air Ministry competition for safety tanks for aircraft commenced at the Royal Aircraft Establishment, Farnborough, on Dec. 5, and will continue thereafter on alternate days until the tests have been completed. The object of the competition, for which prizes amounting to £2,000 are being offered, to obtain, if possible, a tank which will withstand the shock to which it may be subjected in an airplane crash without either bursting or leaking, and thus eliminate almost entirely the possibility of fire in such circumstances, and which will also withstand the effect of enemy action by machine gun and shell fire. Improvements in design and inspection have already practically removed the danger of fire from internal causes during flight, and the satisfactory solution of the present problems will mean further substantial progress. The competition which, owing to its importance, was thrown open to all the world, has brought in twenty-six entries— nineteen from Great Britain, three from France, and one each from America, Belgium, Italy and Japan. Three prizes will be awarded, the first being £1,400, the second £400 and the third £200.

An experiment was recently carried out at Farnborough by the staff of the Royal Aircraft Establishment to discover if a parachute would ensure safety to an airplane pilot in the event of a spinning nose dive. A Camel biplane was detached, nose downward, from an observation balloon at a height of some 2,000 ft., and when half-way to the ground a weight bearing a parachute broke away from the plane. The altitude apparently was not enough, for the parachute did not expand until it had nearly reached the ground, and it landed with some violence. Further experiments are to be tried under slightly different conditions.

Spain

The Spanish Air Traffic Co. of Madrid has bought two Fokker airplanes of the latest type. These will be put into regular service on an air line between Sevilla, Spain, and El Araish (Larache) Morocco. The distance between these points is 170 miles and includes the crossing of the Strait of Gibraltar. This line, which also carries Spanish mails, was recently opened with much ceremony, including a blessing of the machines by the Bishop of Sevilla.

Argentina

The Ministry of War has ordered that on each landing field belonging to the Government and under said Ministry, a visual signal is to be painted consisting of one, two or three capitals placed in the center of the field. The upper part of these capital letters will face the north. The letters will be painted as if each one was surrounded by the lines of a rectangle of 20 by 10 m. Each letter will have a width of 3 m.

The military airdromes will have a horizontal band three meters in width on the lower part of the letters right across the same. The letters may be made either out of brick, wood, or any other material, and should be inlaid in the ground so that they will not mean the slightest obstacle for the taxying of the airplanes; also they will be whitened with lime, in order to be able to distinguish them from high up.

Civil airplanes will not be allowed to land on fields where military airdromes are located without previous authorization or, in case of serious trouble, when permission will be requested from the air by given signs.

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